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ON DOUBLE CONSCIOUSNESS.

EXPERIMENTAL PSYCHOLOGICAL STUDIES.

BY

ALFRED BINET.

WITH AN INTRODUCTORY ESSAY ON EXPERIMENTAL
PSYCHOLOGY IN FRANCE.

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INTRODUCTORY.

EXPERIMENTAL PSYCHOLOGY IN FRANCE.

It is known that of late years, in France, a great scientific movement has come about in favor of experimental psychology. While the professors of our High Schools and Universities are continuing to teach an antiquated science, whose only method is that of introspection, there has arisen on all sides in the philosophical reviews, and even in journals strictly medical, a body of work in which the investigation of mental phenomena is conducted according to the methods of natural science. Incontestably, the forerunner of this activity in psychological inquiry was M. Taine, who published in 1869 an important treatise upon "The Understanding." With remarkable penetration M. Taine foresaw, to a certain extent, the most important results obtained in recent years. Thus, the entire chapter upon "Images" may still be consulted with profit.

The real inaugurator of the psychological movement proper, is M. Ribot. The psychologists of France owe much to M. Ribot. Without him, without the Review* which he founded, without the work

* The *Revue Philosophique*.

and results of foreign* investigation which he has made known in France, many scientists would never have thought of devoting their attention to psychological research. Further, by instituting a chair at the Sorbonne, and subsequently, at a quite recent date, at the College de France, M. Ribot has helped to give an official consecration, in our country, to the study of experimental psychology. Finally, some few years past, in conjunction with M. Charcot, M. Ribot founded a Society of Physiological Psychology which now counts more than fifty active members. In drawing together men of different professions, in bringing the psychologist into communication with the physiologist, the physician, the alienist, the mathematician, and the linguist, that society has fathered a great number of important productions and substantially contributed to the development of the science of psychology.

The personal work of M. Ribot is contained in four valuable monographs upon the Diseases of Memory, of Will, of Personality, and upon the Psychology of Attention. We are informed, moreover, that the author has been at work for some time past, upon the phenomena of emotion, and that he will perhaps publish, some day, a monograph upon that attractive topic.

It would be difficult to characterize the work of M. Ribot in a few words. We may say, however, that he has constantly endeavored to stand upon the groundwork of facts, entertaining a horror of metaphysics that is perhaps exaggerated. Not a metaphysician, he is neither materialist, nor spiritualist, nor monist—

* The experimental psychology of England and the experimental psychology of Germany.

nor anything of the kind. He has little love for great systems, and rightly gives precedence to little facts, accurately observed and minutely described. I believe, with him, that the future of psychology lies not in great theories, but in little facts. Respecting the relations of the physical and the spiritual, he regards the matter as a simple concordance, without further going into the problem ; he has frequently compared the state of consciousness to a state superadded, which in no shape modifies physiological processes, and which acts like a shadow opposite a body. He affirms, in different places, that an unconscious phenomenon is nothing else than a purely physiological phenomenon. It will be thought, perhaps, that despite the repugnance of M. Ribot to metaphysics, a certain metaphysical character attaches to the ideas just noticed. I believe, in fact, that we know *absolutely nothing* regarding the nature of unconscious phenomena.

The succeeding essays of this little book, however, will be devoted to the investigation of the latter phenomena in their relation to double consciousness ; and I shall there briefly present the experiments made by M. Pierre Janet and by myself (the latter not yet published) upon the signification of unconscious phenomena.

The method employed by M. Ribot in his admirable monographs, consists in elucidating the mechanism of the normal state by recourse to mental pathology. M. Ribot is neither a physician, nor an observer ; the pathological data which he makes use of are always second-hand ; but with an unusually extensive range of knowledge he unites great discernment in the selection and interpretation of facts. And, besides,

he presents his psychological conclusions in language so clear and precise, as to form a happy contrast to the terminology of the classic philosophers.

In his studies in pathological psychology, the point to which he has given especial prominence, is the law of mental dissolution. This law can be regarded as the key-stone of the structure he has reared. He has very correctly observed, and better than had been done before him, that there are stable states—strongly organized, resistive ; and weak states—unstable, artificial, and easily lost. For instance, in memory, the stable states are the simple and common movements of adaptation ; the more complex are the delicate movements of professional activity, the special memories. In the will, the stable and resistive are the simple impulses, having their origin in an organic state, as hunger, thirst ; the less stable are the complex determinations of volition, in combination with mobile moral elements, such as duty, or remote interest. In attention, the stable is spontaneous attention, kept alert by an active sensation ; the weak is voluntary attention and reflection. Now M. Ribot has shown, that in progressive mental dissolutions, the progression invariably follows the same order ; it proceeds from the less stable to the more stable ; from the more delicately organized to the less delicately organized ; from the higher to the lower. In substance, this is a great law of general pathology, of which M. Ribot has made a happy application to psychology.

By the side of M. Ribot we shall place M. Charcot, the eminent professor of the Salpêtrière, who by his studies of nervous diseases has taken, of late, a prominent position in psychological science. It is M.

Charcot who took the initiative in founding the Society of Physiological Psychology; he is president for life of that society. M. Charcot has written no special treatise upon psychology: in fact, he writes but very little. Aside from a few productions in conjunction with his pupils, the only works that we have from him are the reports of his lectures at the Salpêtrière. In these lectures the psychological method is frequently introduced, whenever the theme demands an explication of the complicated web of psychical phenomena. We shall cite, by way of instance, the lectures upon hystero-traumatic paralysis, wherein the eminent professor has firmly established the influence of the *idea* upon motory disturbances; and further mention must be made of the admirable lectures upon aphasia, wherein the psychology of language has been so happily resorted to in explanation of the diseases of that important cerebral function.

A former pupil of M. Charcot, M. Charles Richet, at present professor of physiology in the Faculty of Medicine at Paris, has contributed to the advancement of experimental psychology in France by a considerable number of original works. After 1870, M. Richet was the first investigator to reinaugurate the study of hypnotism; he was, likewise, the first to see in these studies a field of psychological research, "a method of intellectual and moral vivisection." Among the phenomena of suggestion there are several that belong to him especially; thus, he was the first to show that the personality of a subject put to sleep may be transformed, and every remembrance of the true personality effaced, by suggestion, from his memory, and a fictitious personality substituted. He has also propounded quite ingenious ideas upon the

phenomena of unconsciousness; he has brought out the fact, that in hysterical persons and in a great many individuals reputed normal, there exists a sort of a permanent semi-somnambulism; in other words, there is, in these subjects, an unconscious ego, an unconscious activity, which is constantly on the watch, which contemplates, which gives attention, which reflects, which forms inferences, and lastly which performs acts—all unknown to the conscious ego. Finally, M. Richet has published, during recent years, in the *Revue Philosophique*, of which he is an assiduous associate contributor, a long essay upon "Mental Suggestion," which has attracted considerable notice. His researches tend to the conclusion, which the author regards as probable, that thought is transmitted from one brain to another without the intervention of signs appreciable to our senses. The proof, the author himself confesses, is not complete. M. Richet arrives at a probability merely. The numerous treatises that have been published in France upon this subject, are to be attributed to the impetus given to the question by the article of M. Richet.

Another pupil of M. Charcot, M. Féré, now physician at the Bicêtre, has distinguished himself in recent years by his many researches in experimental psychology, the subjects of which have been principally phenomena of hysteria. In conjunction with me, M. Féré first entered upon a course of investigations in hypnotism and allied subjects. Our work together, which still continues, has produced as its main result a book upon "Animal Magnetism," in which this subject is treated of particularly as a branch of psychology. In this line of ideas, M. Féré has made an especial study of hallucinations, and of systematic

anesthesia and paralysis. The investigations referred to have occasioned a great deal of controversy in the circles known as the School of Nancy. The physicians of Nancy have called in question certain conclusions reached by the School of Salpêtrière ; but it must be remarked, that as regards the facts of suggestion all discussions that have arisen have related only to verbal differences.

M. Féré has lately pursued, in ingenious experiments upon hysterical and hyper-excitable subjects, investigations upon the psychology of movements. He has shown that the quantity of movement produced depends upon the nature of the sensation. Every sensory excitation, for instance the sight of a red square, at first induces an augmentation of force—a dynamogeny—measurable on the dynamometer ; then, according as the excitation is prolonged, the force diminishes, and dynamogeny gives way to enfeeblement. Such, in rude outlines, are the experiments in psycho-mechanics by which M. Féré has established a quantitative relation between sensations and movements.

We are obliged to be brief in the present sketch of French psychologists. In conclusion, therefore, we shall simply note the names of M. Espinas, who has published valuable studies upon animal communities ; Bernard Perez, who has given to the world several attractive volumes upon the psychology of infants ; Pierre Janet, to whom we owe the highly ingenious investigations into unconscious manifestations of mind ; Egger, known through his highly interesting study of internal audition, auto-observation ; Beaunis, who has written upon inhibitions, upon hypnotism, upon the muscular sense, etc.

Accordingly, as may be gathered from the preceding sketch, there is not, in France, a *school* of psychology; there are no masters and disciples; there is not a body of accepted doctrines. We all work upon our own individual score, without being subject to any common word of command; we are dispersed, like skirmishers, upon the field of research. In his inaugural lecture at the Collège de France, M. Ribot correctly stated that the characteristic mark of French psychological research was the production of monographs. We possess, in fact, a certain number of experimental studies upon special subjects. We have no universal work, discussing, even in brief, the entire province of psychology. M. Ribot, in adverting to this want, said that two years would be demanded to prepare a treatise upon French psychology, and that, probably, by reason of the rapid advances being made in our knowledge of this subject, when the treatise were finished, it would no longer be available for current use.

This being the character of French psychology, it would be very difficult to state the opinions upon which any great number of thinkers of our country have united. How do we know, for instance, the views of M. Charcot upon Personality, when he has not as yet had occasion to express himself upon that point? All that we can do is to endeavor to bring into relief the main tendencies of French psychological inquiry and to indicate the methods preferentially employed.

With relatively few exceptions, the psychologists of my country have left the investigations of psychophysics to the Germans, and the study of comparative psychology to the English. They have devoted themselves almost exclusively to the study of pathological

psychology, that is to say psychology affected by disease. Such, if I do not mistake it, is the foremost feature of our work in psychology. One need only glance at the titles of the principal original treatises of M. Ribot to note that they treat of pathological conditions: Diseases of Memory, of Will, of Personality, etc. All the other authors have followed his example; they have sought in the pathology of the mind or in the pathology of nervous action, the data to render intelligible the mechanism of the normal state. The marked favor that studies in hypnotism have met with in France, is a further proof of the preponderance acquired by pathological psychology. The results obtained by the systematic employment of the pathological and clinical methods, have been extensive; but at the present time they yet remain scattered in a mass of reports accessible only to specialists. Consequently, these results are almost unknown to the psychologists of foreign countries. Thus is explained a circumstance that does not fail to excite surprise. Although it is well established that pathology has furnished psychology with the most recent and the most numerous results, yet the works upon psychology appearing in Germany, in Italy, in England, and in America, and which pretend to give a complete picture of the present state of psychological research, say almost nothing of the investigations of mental and nervous pathology. The scientific work, really French, is not recognized, and is practically suppressed.

Proof of Double Consciousness in Hysterical Individuals.

THE psychologists of France, during the past few years, have been diligently at work studying the phenomena of double consciousness and double personality in hysterical individuals. The same problems have also been the subject of numerous investigations in foreign countries, especially in England and in America; and the phenomena of automatic writing, which are now so often described in the scientific periodicals of both the above-mentioned countries, are evidently due to that doubling of personality which is so manifest in a vast number of hysterical people.

I wish to devote a series of articles to these problems, which are of such high importance to the psychology of normal states as well as to the psychology of nervous diseases. After briefly recurring to the results of former studies, published in the *Revue Philosophique*, the *Archives de Physiologie*, and in the *Comptes rendus de l'Académie des Sciences*, I shall set forth, with more or less extensiveness, my recent observations.

In approaching so delicate a subject we must in the first instance insist upon a question of method. When we undertake to expound such strange phenomena as those of the doubling of consciousness, at the first blush we naturally provoke astonishment and even doubt. In truth, is not the idea extraordinary, that in hys-

terical individuals there should exist two distinct personalities, two egos united in the same person? I have frequently had occasion to speak of the doubling of consciousness to persons who were unfamiliar with science, and even to physicians, and I can verify the fact, that people as a rule regard the phenomena in question as highly doubtful ; for they imagine that there do not yet exist precise experiments adequate to establish this duplication of personality. In fact, in order to recognize and admit exceedingly delicate intellectual perturbations of this order, we must be presented with objective, palpable, and actual evidence of their existence. The experimentalist must strive not only to discover the psychological phenomena which explain so many manifestations of mental alienation, but he must also, and with equal care, seek the method of experiment that commands conviction and that renders such phenomena clear and evident to everybody.

The idea of such a method has guided me from my earliest researches, and I have particularly endeavored to discover the simplest possible experiments, such as might be repeated at the bedside of patients without previous preparation by any physician that might be first called in. It is doubtless interesting to know, that at the present day we possess the means of clearly exhibiting the duality of persons in hysterical patients, without being obliged to resort to the hypnotizing of our subjects or to submitting them to any complex and ill-defined influences. The patient, in the normal condition, is almost as if awake, and the process employed to reveal the two personalities which he contains is as direct and as simple as that which consists of counting the beatings of his pulse.

Before presenting the recent researches that I have

made, I believe it profitable first to recapitulate the processes of investigation employed. I may add that the results that I have obtained, have been fully confirmed by the researches of other authors, among whom I shall cite my friend, M. Pierre Janet, who has recently published a very interesting work upon this topic.*

In performing our experiment we must have recourse to hysterical patients who in certain parts of the body present a more or less extended region of insensibility (anæsthesia). Nothing is more common than hysterical anæsthesia. At times it will appear in the form of small islets, of small spots irregularly scattered about. An hysterical patient, for example, may exhibit a small anæsthetical spot in the palm of his hand. On forcing a pin into this spot, or pinching the skin, or burning it, the subject will not experience the slightest sensation of contact, or sensation of pain; while, nevertheless, a few centimeters away from it the same excitations will produce a very keen and painful reaction. With other patients the anæsthesia reveals a more regular distribution; it may, for example, comprise an entire limb, as an arm which has become insensible from the extremity of the fingers to the shoulder-joint. With other patients the distribution of insensibility is even still more remarkable; the patient is divided into two halves by a vertical plane extending through the breast to the back, so that one half of his body—head, trunk, arm, and leg—is completely insensible, while the half corresponding preserves its normal sensibility. Finally, it is not rare to meet with hysterical persons whose insensibility extends to the entire body; but in such cases the insen-

* *L'automatisme psychologique*. Paris: 1889. F. Alcan.

sibility is generally more marked in one half of the body than in the other.

Let us now turn to a patient exhibiting an insensibility extending to an entire limb. Let us first assure ourselves by means of a few painful tests that this insensibility is not simulated. Several means are adaptable for this purpose. Thus, whenever a patient feigns the loss of sensibility, if, without warning him, we suddenly excite his skin from behind a screen and he betrays a movement of surprise, it is a proof that he has felt the sensation. When we allow an electric current of increasing intensity to pass through his limb, there certainly must arrive a moment, in which the pain is so intense that he cannot any longer endure it. But genuine insensibility will come out victorious from all such tests. Let us add that with hysterical individuals the power of pressure upon the dynamometer, in the insensible members, is generally weakened, and that the time of physiological reaction is prolonged. The tests described, accordingly, may be regarded as sufficiently numerous and competent to defeat any attempt at imposition.

I suppose, now, that we are occupied with a patient who exhibits a genuine anæsthesia, controlled by all the clinical tests which the modern physician has at his command. I shall take for granted, further, that this insensibility, limited to a single limb,—the right arm, for example,—affects all the tissues of the limb; that not only the skin, but muscles, tendons, and articular surfaces have lost all trace of sensibility. The patient feels neither puncture nor compression; neither pinching, faradization, nor passive movements impressed upon his limb, when we have taken care to

hide from him the sight of his limb by the interposition of a screen.

Under the above-mentioned conditions the experimentalist seizes a finger of the insensible hand, and impresses upon the finger in question alternate movements of flexion and of extension; the patient, be it understood, not being able to see his own hand, does not know what is being done to him; he does not know whether they are bending or stretching one of his fingers. Nevertheless, it frequently happens that the finger thus manipulated spontaneously continues the movement which the experimentalist has impressed upon it; we may observe that it bends and straightens out again five or six times. The very same thing would happen if we had caused the wrist or elbow to perform passive movements.

Now, what does this experiment prove, which admittedly is very simple and easy of repetition? Evidently, in order that the finger should spontaneously repeat the movement that has once been impressed upon it, it is necessary that the movement in question should have been perceived. The patient nevertheless declares that he has not felt, or experienced, anything in his finger. We must, accordingly, suppose that an unconscious perception of the movement has been produced; there doubtless has been a perception; the perception has engendered a similar movement—this too seems evident; but neither the sensation nor its motory effect have entered within the circle of the subject's consciousness. This little psycho-motory performance has been accomplished without his knowledge, and so to speak, quite outside of him.

Let us complicate our experiment a little, in

order the better to understand it. The eyes of the subject are throughout kept concealed behind a screen. We now place some familiar object into the insensible hand ; for instance, we thrust a pen-holder or a pencil between the thumb and the index-finger. As soon as the contact takes place the two fingers draw together, as if to seize the pen ; the other fingers bend half-way, the wrist leans sideways, and the hand assumes the attitude necessary to write. In the same manner by introducing the thumb and index-finger within the rings of a pair of scissors we cause the subject to perform the movements of one who wishes to cut. These experiments, of course, may be varied indefinitely ; further instances, however, would be superfluous ; the two given amply suffice for the purposes of our analysis.

Here also the entire transaction takes place outside the consciousness of the subject ; the pen-holder was seized by the anæsthetic hand, without the subject's perceiving, in a conscious manner, any contact, and without his knowing that he held a pen-holder in his hand. Now, this very simple act, performed by the hand, is an act of adaptation ; it implies, not only that the object has been felt, but also that this object has been recognized as a pen-holder, for if the object had been a different one a different act of adaptation would have taken place. In this manner, the sensation must be said to have provoked an unconscious perception, an unconscious reasoning, an unconscious volition. In short, the event happened just as if the pen-holder had been thrust into the sensible hand ; as if the subject had felt the object, had recognized it and decided to write ; with the sole

difference, however, that apparently the whole process was without consciousness.

The theories of Huxley and of several English authors concerning the part played by consciousness in psychological phenomena seem here to find direct application; yet, as a matter of fact, this is only apparently so, as we presently shall see. According to Huxley consciousness is an epi-phenomenon, a superfluous phenomenon, superadded to the physiological process, but which reacts no more upon that process than the shadow of the individual upon the individual itself; you may suppress consciousness, and yet all physiological phenomena will continue to be produced automatically just as before; objects will continue to be perceived; unconscious reasonings will develop, followed by acts of adaptation.

Let us add a new complication to our last experiment, and we shall find as a result, that Huxley's hypothesis is manifestly too simple to explain it. Up to this point we have limited ourselves to the production of movements in an insensible region; these movements, however, were very elementary, and would not betray a well-developed thought. We may essay to provoke certain acts of a more intellectual character and of decidedly higher organization. The following is an example selected, as the preceding ones, from among many others.

We put a pen into the anæsthetic hand, and we make it write a word; left to itself the hand preserves its attitude, and at the expiration of a short space of time repeats the word, often five or ten times. Having arrived at this fact, we again seize the anæsthetic hand, and cause it to write some familiar word, for example, the patient's own name; but in so doing,

we intentionally commit an error in spelling. In its turn the anæsthetic hand repeats the word, but oddly enough, the hand betrays a momentary hesitation when it reaches the letter at which the error in orthography was committed; if a superfluous letter happens to have been added, sometimes the hand will hesitatingly re-write the name along with the supplementary letter; again it will retrace only a part of the letter in question; and again, finally, entirely suppress it.

Plainly, when the experiment successfully reaches this degree of complication, we cannot explain it by merely invoking unconscious phenomena. The correction of an orthographic error by the anæsthetic hand indicates the presence of a guiding thought; and it is not perfectly clear, why the thought that directs the movements of the writing should be unconscious, while that which controls the movements of the word should alone be regarded as conscious. It would seem more logical to admit, that in these patients there exist two distinct consciousnesses. The first of these consciousnesses gathers up the sensations proceeding from the sensible members; the second is more especially in connection with the insensible regions.

In this manner we are able to verify that doubling of consciousness which in recent years has become the object of so many investigations. There may certainly have been given more striking examples of the phenomena in question; and there have been published observations in which the two consciousnesses are to be seen each performing a different task, and reciprocally ignoring each other. But all these curious observations are generally presented under conditions so very complex that it is difficult to combine them for

the purposes of a correct verification. The methods of investigation, relative to hysterical anæsthesia, that we have just set forth, at least possess the merit of furnishing a strict proof of double consciousness.

This, however, does not imply that the methods employed yield results with all patients indiscriminately. Many hysterical individuals do not react at all when the experiments mentioned are being performed upon them. But we must mistrust all purely negative experiments, which simply prove that people did not know how to set about the business in hand. I have advanced the hypothesis, that when we are unable to provoke the repetition of the movements, or acts of adaptation, in anæsthetic regions, our failure is due to a defect in the organization of the second consciousness; the excitation brought to bear upon the insensible region is perfectly perceived, but it does not directly lead to a determined movement; there are no actual associations, ready to play between sensations and movements. Repetition of the experiments, however, may produce these necessary co-ordinations.

At this point, accordingly, we are in possession of precise observations; we know that in hysterical individuals there exist phenomena of double consciousness, and using this as a starting-point, it now remains for us, to develop our knowledge of this phenomenon through additional experiments.

The Relations between the two Consciousnesses of Hysterical Individuals.

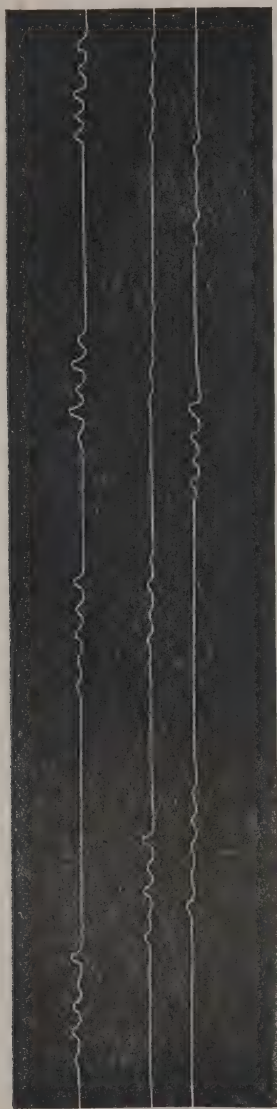
WHENEVER we chance to discover a new fact, we seldom describe it correctly. As a rule, we regard it as simpler than in reality it is. The observers who first investigated double consciousness in hysterical persons occupied themselves particularly with putting in a clear light the phenomenon of the separation of the two consciousnesses; this was, in fact, the first thing to be done. But the study of the numerous relations existing between these separate consciousnesses was almost entirely neglected. It is our purpose, in this paper, to recapitulate and present, in an abridged form, the results of investigation on this topic; and I am convinced that some day it will furnish the clue to a great number of phenomena of mental alienation. Inward voices supposed to be heard by demented individuals, their fixed and impulsive ideas, the delirium of possessed persons, are very probably phenomena produced by the doubling of consciousness, and by the influences that one of the consciousnesses exerts upon the other.

For the time being we shall remain true to the methods that we have followed in our previous study. We shall eliminate all complex and ill-defined observations and adhere, by preference, to small, simple,

and precise experiments, easy of repetition, which, without teaching us the phenomena in their total development, at least yield an imperative proof of their reality, which certainly must be regarded as a decided advantage.

Automatic writing furnishes the first illustration of the relations between the two consciousnesses. It is a most important phenomenon and is worth the trouble of being carefully studied. An examination of the scientific collections of England and America shows that in those countries the subject is frequently investigated. Professor William James has recently sent me a work in which he recapitulates certain very curious experiments performed by him upon normal individuals, or, at least, individuals who were supposed to be such. The results obtained by him afford me particular interest, since they closely resemble those obtained by myself with hysterical individuals.

Automatic writing forms part of a class of movements that have now for a long time been the subject of inquiry in France, and which may be described under the general name of unconscious movements produced by ideas. As a result of numerous observations it is now a well-known fact that with excitable individuals every idea produces in the body unconscious movements which at times are so precise and clear, that by registering them we are able to guess at the person's thoughts. The method of the experiment is frequently the following. The individual is asked to think of a word, a number, or of any object whatsoever, and at the same time a pen is thrust into his hand, with the assurance that his thoughts will be divined. It frequently happens then, that the person, although not feeling any movement in his hand, will



Experiment performed upon P. S. . . ., hysterical, hemi-anæsthetic right hand. The subject with eyes closed, holds in his right insensible hand a rubber tube fastened to a registering apparatus. We ask the patient to think of a number, and not to make any movement. It may be seen from the above tracing that the patient from time to time squeezes the tube that he holds in his hand five successive times; this movement is at the same time involuntary and unconscious. Minimum velocity of the cylinder, a complete revolution in one minute.

spontaneously write the word that he has thought of. This experiment affords an elementary instance of the operation known as thought-reading, and we at once understand how any clever experimentalist may be able to dispense with the use of the pen, and to guess at a man's thought by simple contact with the hand.

As might be readily expected, such movements provoked by ideas are produced in hystherical persons with the greatest facility. When a pen-holder is placed in the hand of an anæsthetic subject, the automatic writing will be produced without his knowledge, and we are thus able to learn the most secret thoughts of the patient. A careful study of these movements will furthermore prove, that they are less simple than is generally supposed. They are no mere reflex-movements produced by ideas. This is proven by the fact that the manner in which the idea is expressed depends upon the attitude given to the anæsthetic hand. Thus, we ask the subject to think of the number 3. If he holds a pen in his hand he will write the figure 3. If he has no pen, and if before the experiment we have several times shaken the fingers of the insensible hand, the subject will raise his finger three times ; the same will apply to the wrist or to the movement of any other member. If the subject has a dynamometer in his hand he will press three distinct times upon this instrument. If the experimentalist himself assumes the initiative by raising the finger of the subject a certain number of times, the finger after having yielded three times to the impressed movement will stiffen, as if it thus wished to inform the experimentalist of the number that had been thought of. All these experiments, and particularly the last, show the intervention of the second consciousness in the expression of the

idea of the number three. The first consciousness furnishes the idea, and the second consciousness determines the manner in which the idea shall be expressed ; there is, accordingly, a concurrence of the two consciousnesses, a collaboration of the two egos for one common task.

By a singular phenomenon the automatic writing does not limit itself to making known what takes place in the principal consciousness of the subject ; it is at the same time in the service of the second consciousness, so that, according to the nature of the cases at issue, the first consciousness sometimes directs the hand of the subject and at other times the second consciousness. We have collected several observations which leave no doubt on this point. Let us begin with the very simplest.

Letting the subject hold a pen in his anæsthetic hand, we trace a letter, or some such sign, upon the back of the hand. The automatic writing will at once reproduce the word that has been traced ; the word itself, be it understood, not having been perceived by the principal consciousness, because the excitation was performed upon the skin of an anæsthetic member, and because anæsthesia in some way is the barrier separating the two consciousnesses. If the word has been reproduced, it accordingly must be because the second consciousness has perceived it, and consequently this simple experiment proves that the second consciousness can express itself by automatic writing.

It may be remarked, in passing, that automatic writing affords us a very convenient means of exploring the sensibility of any apparently anæsthetic limb ; and we are also able by employing this method to measure the sensibility with an æsthesiometer. In

fact, nothing is simpler. Let us prick the insensible hand with one of the points of a pair of compasses: the automatic writing will trace a single point. Thereupon let us apply at the same time both points, and the automatic writing, after a little practice, will be able to tell us whether the points have been distinguished or confounded; their distance apart, in millimeters, will give us the respective degree of sensibility. Every time that I applied this method to hysterical subjects I was able to verify that notwithstanding anæsthesia sensibility had remained normal; we can easily understand that the contradiction here is only in the terms employed.

Automatic writing does not only serve to express sensations perceived by the second consciousness; it is likewise able to express the thoughts that this second consciousness spontaneously combines. Hysterical persons have been found who, when a pen was put into their hands and their attention diverted, began to write, unconsciously, entire well-connected phrases, recitals, confessions, etc. The principal subject—the one with whom we communicate by word—suspects nothing, and does not see what his anæsthetic hand is doing; it is the second consciousness which employs this mode of expression. I myself have made this experiment upon a subject, and other authors have likewise reported several instances.

The latter form of experiment is evidently the one that approaches nearest to the experiments upon automatic writing which at the present time are being conducted in England and America. They consist in asking a person to place his hand upon a planchette that can serve for the purposes of writing and to remain immovable without thinking of anything. When

the subject is nervous it will sometimes happen that the planchette becomes agitated and begins to write thoughts entirely foreign to the subject ; the latter remains motionless and has no consciousness of anything. It may be assumed, with great likelihood, that under such conditions an intellectual doubling of the subject takes place, analogous to that which we have observed in our hemi-anæsthetic, hysterical patients. Only, in the case of an hysterical individual, the doubling is easier, in consequence of the insensibility which reigns in a part of the body ; it being easily comprehensible that the acts of the second consciousness, produced by preference in the insensible regions, remain unknown to and concealed from the principal consciousness. It may happen, however, with certain non-hysterical subjects that experiments of doubling bring about a transitory anæsthesia, and Mr. W. James has recently observed, that while one of his patients was writing with the planchette he did not feel the painful excitations inflicted upon his arm, whereas the second consciousness perceived them distinctly, and complained of the same by means of the automatic writing.

Such complications of phenomena produce consequences which it is easy to foresee. It may happen that at the moment at which the principal consciousness wishes to write a word, the second consciousness may have the same intention, and may wish to write an entirely different word : hence a conflict. A very simple experiment will illustrate this conflict. Let us seize the anæsthetic hand, and let us cause it to trace behind a screen the word "Paris." We know that this word will be repeated several times. Thereupon addressing ourselves to the principal subject, we will ask him to write the word "London." The subject,

entirely ignorant of what has just taken place, eagerly seizes the pen with the intention to carry out our wish, but to his utter astonishment the indocile pen instead of writing London, writes Paris. Is not this a phenomenon analogous to those irresistible impulses which, in madness, consciously reveal themselves,—impulsions to theft, murder, arson, etc., which suddenly manifest themselves to the great surprise of the patient, the latter submitting to the impulse without comprehending it. It is evident that these kinds of experiments are destined to throw a flood of light upon several still obscure points of mental pathology.

In the preceding exposition we have studied the motory relations of the two consciousnesses ; we have seen them either uniting their efforts to accomplish the same act, or conflicting with regard to something to be accomplished. But there exists a second kind of relations between the two consciousnesses ; namely, the relations of sensations and of images. It may happen that the sensation which has possession of a first consciousness awakens an associated image in the second consciousness, so that, by a unique intellectual process, one of the parts will be conscious for one of the egos, and the other for the second ego. The facts pertaining to this order of relations are extremely curious and instructive. We shall limit ourselves to those that are the simplest and most easily produced.

Let us once more turn our attention to an anæsthetic, hysterical patient ; we will make a series of impressions upon his insensible hand ; our subject feels absolutely nothing. It would, accordingly, be idle to ask him how many impressions we have made, because he does not even suspect that his hand has been pressed. And yet, the highly extraordinary fact re-

mains, that the subject, although apparently not having felt anything, possesses an idea of the number of excitations that have been made upon him. The following is proof: Let us make ten punctures in the insensible hand and thereupon let us ask the subject, who, as a matter of course, has not seen his hand, which is hidden behind a screen, to think of some number and to name it; very frequently the subject will answer that he is thinking of the number ten. In the same manner let us put a key, a piece of coin, a needle, a watch into the anæsthetic hand, and let us ask the subject to think of any object whatsoever; it will still happen, yet less frequently than in the preceding experiment, that the subject is thinking of the precise object that has been put into his insensible hand.

It is important to note, that in all these cases the subject believes he is thinking voluntarily and without constraint; the experimentalist, while compelling him to think of the number ten, not depriving him of the illusion of his freedom of will.

How shall we explain this result? How is it possible that, in consequence of an excitation not felt, the subject should have a determined idea? We shall be able to explain everything by supposing simply, that the unconscious peripheral excitation, for example the puncture of the anæsthetic hand, awakens, by way of association, corresponding phenomena of ideation. But in reality matters are more complex. We have to admit rather, that when we excite the anæsthetic hand, in different ways, by puncture or by contact with an object, the second consciousness perceives the sensation, counts the punctures, recognizes the object, and, for the purposes involved, abandons itself to more or less complicated intellectual acts. These intellect-

ual acts are the final stage of the process, which has had its origin in a sensation ; now this final point, this result, this conclusion is the thing that alone penetrates into the first consciousness. For example, when punctures are made in the skin, one of the consciousnesses counts the sensations, finds their sum-total, and this sum-total it is that reaches the other consciousness, not indeed under the form of tactile sensations, but under the abstract form of a number.

To sum up. From the foregoing we perceive that the separation of the two consciousnesses does not interrupt all communications between them. The associations of ideas, of images, perceptions, and movements, that is, of all that pertains to the sphere of lower psychology, is preserved nearly intact ; and hence an idea in the first consciousness provokes a movement in the second, and inversely, a sensation perceived by the second consciousness can awaken an idea in the first consciousness.

In the following essay we shall apply these results to the study of the hysterical eye.

THE HYSTERICAL EYE.

THE various forms of retinal sensibility which are met with in hysterical individuals have been carefully studied by M. Charcot and his pupils, who have shown that the phenomena in question, which persist during the interval of hysterical crises, and which can exist where there are no crises, constitute permanent stigmata, enabling us to discover hysteria without the aid of convulsive attacks of any sort. At the present time we are quite well acquainted with hysterical amaurosis, with the concentric contraction of the field of vision, with disturbances affecting the perception of colors, and disorders of adjustment.

What is much less known, is the reason, the mechanism, of this anæsthesia of the retina. The many experimentalists who have hitherto studied the subject in question, have pointed out a number of peculiar features rather difficult of comprehension, in fact so strange and striking, that some have ascribed them to simulation on the part of the subjects. To furnish a precise and clear instance of this, we may state, that there are hysterical individuals who, with both eyes open, perceive colors which they cannot distinguish with one of their eyes alone; while it seems even more wonderful that there should be hysterical persons who do not see at all with one eye, when that eye alone is open, but whose unilateral blindness disappears as

soon as the function of vision is performed simultaneously with both eyes.

Let us dwell for a moment upon the instance given, and later we shall endeavor to explain it.

We have for examination an hysterical person who has entirely lost the sight of the right eye. Let us place before the patient's eyes a 'box of Flees'; that is, a box furnished with two eye-holes. On the bottom of the box are placed two points of different colors, the one to the right, the other to the left; and by a skillful arrangement the patient sees with his right eye the point situated to the left, and with his left the point situated to the right. This is the method employed to detect shamming and simulation; for instance, in the case of soldiers drafted for the army. Thus the shamming individual, who pretends not to see with his right eye, will say that he does not see the point which appears to the right; but that is the point which is seen by the left eye. The hysterical individual acts somewhat differently, for he actually sees the two points—that to the left, and that to the right; he accordingly sees with both eyes.

A great many hypotheses have been advanced in order to explain these apparent contradictions—anatomical hypotheses, like that of M. Parinaud, and psychological hypotheses, like that of M. Bernheim. For the time being we shall leave this matter aside. It will be far more profitable to begin by setting forth our recent observations; for a simple observation can often better point out the incorrectness of an hypothesis than any number of arguments.

Experiments which we have made in the preceding essays with reference to the insensibility of the sense of touch in hysterical subjects, have shown us of what

nature this insensibility really is. As a matter of fact the hysterical subject is doubled; he possesses two distinct consciousnesses; and one of these consciousnesses accurately perceives all the excitations that have been impressed upon the insensible region.

We might already suppose, 'a priori', that insensibility of the retina cannot in any respect differ from insensibility of the skin in hysterical persons. The facts that we have previously set forth, confirmed by different authors and derived from our own experiments, are too significant not to be general. But, we cannot be satisfied with purely theoretical views.

I long sought in vain for some simple, decisive, and purely clinical experiment which might prove that the sensibility of the retina, in cases of hysterical anæsthesia, was only dissociated and not destroyed. Chance, aided in some degree by perseverance, has enabled me to establish the following fact. We place the hysterical subject before a scale of printed letters, and tentatively seek the maximum distance from the board at which the subject is able to read the largest letters. It frequently happens with hysterical persons that the vision of forms at a distance is very imperfect; a circumstance which may be owing either to weakness of visual acuteness or to a defect in the mechanism of adjustment. For the present we are not attempting to distinguish these two facts from one another.

After having experimentally determined the maximum distance at which the subject can read the largest letters of the series, we invite him to read certain smaller letters that are placed below the former. Naturally enough the subject is unable to do so; but, if at this instant, we slip a pencil into the anæsthetic

hand, we are able, by the agency of the hand, to induce automatic writing, and this writing will reproduce precisely the letters which the subject is in vain trying to read.

This process of experimentation has the pre-eminent advantage of taking the subject in his natural condition—while awake and at rest; for the power of automatic writing persists with him, and this automatic writing has moreover the advantage of revealing to us the latent depths of consciousness that remain unknown to the subject.

After the investigations which we have made upon the hysterical anæsthesia of the skin, an explanation of the preceding phenomenon seems to me wholly superfluous, and I shall be satisfied with the assertion that the second consciousness possesses a stronger visual acuteness than the first consciousness.

It is highly interesting to observe, that during the very time the subject is repeatedly declaring, that he does not see the letters, the anæsthetic hand, unknown to him, writes out the letters one after another. If, interrupting the experiment, we ask the subject to write, of his own free will, the letters of the printed series, he will not be able to do so, and when asked simply to draw what he sees, he will only produce a few zig-zag marks that have no meaning.

Let us further remark, that although the subject maintains that he sees nothing, the automatic writing nevertheless reproduces all the letters marked on the black-board with perfect regularity, without omitting a single letter, beginning at the first and finishing with the last. We must, accordingly, suppose that during the experiment the second consciousness di-

rects the line of sight, without the knowledge of the principal subject.

The visual acuteness of this second consciousness in the subjects which I have examined has seemed to me to be equal to the normal acuteness. If we place the subject at too great a distance from the black-board the automatic writing will begin to hesitate ; the subject will thereupon commit real mistakes ; for example, he will read "Lucien" instead of "Louisa," which, incidentally observed, proves that the phenomenon wrongly bears the name of automatic writing ; an automaton does not mistake ; the second consciousness, on the contrary, is subject to error because it is a consciousness, because it is a thing that reasons and combines thoughts.

In the course of investigations of this kind there sometimes arise certain perturbations which are very important to understand, and which afford a fresh proof of those manifold relations existing between the two consciousnesses that we investigated in a former paper. Thus, when the subject is convinced that he cannot read the letters on the board, it may happen that the automatic writing, controlled by this state of consciousness, will confine itself to translating the same, so that the anæsthetic hand will indistinctly trace the words which the subject is muttering in a low voice to himself, as "I do not see, I do not see"

A second perturbation arises from the fact, that the subject, during the time that the hand is unconsciously writing the word, believes he has a vague perception of this same word. In reality this is only an illusory perception. To produce this phenomenon we have to call into play the automatic writing, by putting a pencil into the anæsthetic hand ; and, as a matter of fact,

it is the more or less vague perception of these movements of automatic writing that makes the subject believe he has a visual perception of the word, whereas he has only a visual image of the same. Even this image, at times, is rather vague. Thus, one of our subjects, while his hand wrote the word "Marguerite," said he thought he saw the name of a woman. But, how could it be possible to perceive, with his eyes, that a word is the name of a woman, if he could not spell the word in question? Evidently, in this case, visual or muscular sensations belonging to the second consciousness, have provoked in the first consciousness an idea of the same kind.

We have already observed an analogous fact in the experiments before reported upon the anæsthesia of the skin and of the muscles; we there saw, that if we shake twice in succession an insensible finger, the subject will think of the number two. The perception of the movements of the finger by the second consciousness had called forth in the domain of the first consciousness an analogous idea, expressed in an abstract form.

Let us remark, in passing, that through these experiments there possibly exists a means of studying abstract ideas.

We have now studied the perception of forms in an eye presenting a weak visual acuteness. The same function may be studied in a completely amaurotic eye, that is, in an eye afflicted with total blindness. It is rare to meet with hysterical patients in whom insensibility of the retina reaches the verge of blindness; but we can very easily produce this phenomenon by way of hypnotic suggestion. I have had occasion to study two hysterical subjects in whom by suggestion all man-

ner of vision had been suppressed in the right eye. I was easily able to establish the fact, that after closing the left eye of the subject, and putting into his anæsthetic hand, without his knowledge, a pencil, the automatic writing was brought to reproduce all the letters which we passed before the amaurotic eye. This amaurotic eye, accordingly, did see, notwithstanding its apparent blindness ; in other words, the second consciousness was the one that saw ; it had not been struck with blindness at the same time as the first consciousness.

This latter experiment enables us absolutely to reject any anatomical theory that has been designed to explain the singular phenomena of which we have spoken at the beginning of this paper. We have said that certain subjects, who with their right eye do not perceive a certain color—for example, violet—will, when seeing with both eyes, easily distinguish this same color, even when, owing to the experimental arrangement employed, the color mentioned is not placed in the visual field of the left eye. This experiment, and many others of a similar kind, lead us to suppose, that the conditions of binocular vision are different from those of monocular vision.

To speak a little more precisely, it has been admitted that there exist two different kinds of visual centres within the cerebral cortex ; in the first place monocular centres, which act, when only one eye is open ; and further, binocular centres, that perform their functions when both eyes are at the same time open. Cerebral physiology, with its usual complacency, has furnished more than one argument in favor of this hypothesis, which, however, ought to be regarded as open to considerable suspicion. This be-

ing admitted, nothing seemed more easy than to explain, how and why hysterical individuals see certain colors when both eyes are open, and not when only one eye performs its functions; people have thought, that it was owing to the fact, that with such subjects the binocular centre is spared while the monocular centre alone is affected.

The last of our experiments absolutely refutes this theory, showing us that a subject with an amaurotic eye is able to register through automatic writing the objects that are placed before it during monocular vision. The monocular centre, accordingly, if it really exist, cannot be any more affected than the binocular centre.

We shall not linger any longer upon this study of visual anæsthesia, which once again proves to us the importance of the doubling of consciousness in hysterical persons, and the necessity of knowing this process of doubling, in order to understand certain symptoms, at first sight so strange, and yet at bottom so logical, which are met with, at every side, in hysteria.

We now know the most elementary facts at the basis of mental dissociation, and we may attempt to plunge to a still greater depth into the study of the phenomenon described.

MECHANISM OR SUBCONSCIOUSNESS ?

IN all the experiments that I have hitherto presented, I have supposed in hysterical persons the existence of a double consciousness. This hypothesis possessed the advantage of explaining how it happens that we are able to provoke in the limbs of such individuals various complex movements of adaptation, which are performed without their knowledge; and we, accordingly, proceeded upon the assumption that these movements were regulated by a secondary consciousness, which does not amalgamate with the principal personality.

But the objection has recently been made, that the hypothesis of double consciousness is not necessary, and that we might explain all the experiments in question by presuming that the movements of the insensible members are parcel of that mechanical activity which is constantly seen at work in habit and instinct, and which seems to perform its functions without the aid of consciousness.

This second explanation, at first blush, is so natural, that when I began my researches I did not hesitate to accept it, even contrary to the opinion of my friend M. Pierre Janet, who adopted the hypothesis of subconscious phenomena. But later, according as my observations and experiments became more numerous, I was compelled to abandon the explanation founded

upon mechanical acts. This, I admit, cost me a great deal; for it is singular to observe, how, despite ourselves, and the desire of being impartial, we ever reluctantly surrender a first idea. I shall, therefore, essay to recapitulate the facts that have brought about my conviction. Some of these facts are new; but the greater part have already been published by me in the *Revue philosophique* of February, 1889; and M. Pierre Janet in his recent book on psychological automatism (*l'Automatisme psychologique*) has added other facts that are highly interesting.

Let us begin with the simplest cases.

We have before us a lady patient, observed in the waking state, whose anæsthetic hand, hidden behind a screen, repeats the movements that it is made to perform; the patient feels nothing, suspects nothing, and believes that her hand is motionless. This repetition of the movement may be regarded as a physiological act devoid of consciousness. Let us complicate slightly the experiment in question. Let us cause the hand to trace the patient's own name, and, in so doing, commit an orthographical error; it frequently happens that the hand, in re-writing the name, hesitates when it reaches the error, or will even correct it. We may still, perhaps, maintain that this is a physiological act devoid of consciousness. But let us continue. There are patients, St. Am—for example, whose hand spontaneously finishes the word they are made to trace; thus, I cause the letter *d* to be written; the hand continues, and writes *don*; I write *pa*, and the hand continues and writes *pavillon*; I write *Sal*, and the hand writes: *Salpêtrière*. Is it possible that this is an act destitute of consciousness? The question, manifestly, is become more doubtful. But there

is a more convincing instance still, for the following case is the most curious that has come under my notice. M. Taine was speaking to me one day, in detail, of an observation that he has inserted in the preface to his beautiful book on Intelligence (*l'Intelligence*). The observation in question relates to a young girl who, at times, would unconsciously seize a pen, and write a whole page, the sense of which she did not understand; this page, always signed by the same name, (M. Taine told me that it was the name of the girl's governess,) was the expression of mournful ideas and sorrowful reflections upon life. What particularly interested me in the matter of this observation was the fact, that I myself, in an observation of my own, have obtained an entirely analogous result, and M. Pierre Janet, likewise, has gotten five or six more. The lady patient, whom I observed, was an hysterical subject, whose right arm was totally insensible. On certain days, when a pen was put into her right hand behind a screen, the hand in question, without further solicitation, would begin to write connected phrases, to which the mind of the patient remained wholly foreign, for while her hand was writing, the patient would be chatting with us about something entirely different. Concerning the explanation of these last facts, the slightest doubt no longer seems permissible; and it is likewise certain that authors who have gathered equally complicated observations, have not hesitated in regard to the manner in which they are to be explained.

In fine, we behold, in this instance, the writing of the anæsthetic hand become the secretary of a complete personality, endowed with its own exclusive ideas, and its own emotions. M. Taine, without the

thought of an objection, admits that these facts are explained by the existence of two personalities in juxtaposition.

I well know that a skeptic could always maintain that the second personality, revealed in our experiments, is a personality destitute of consciousness. I am, indeed, unable to furnish the material proof to convince such a skeptic that he is mistaken. The question of consciousness, as in a future article I shall have occasion fully to demonstrate, is one of the most delicate problems that a psychologist could undertake to solve. Upon the whole, however, it seems to me that there is a great probability in favor of the acceptance of the element of consciousness in such complex psychic manifestations as those I have just cited.

M. Pierre Janet has added to the subject in question a further argument, that ought to be regarded as convincing. How are we led to recognize, he asks, the existence of consciousness in another individual? When we find, for example, that the individual utters connected words, conveying sense. But, if the word is one mode of expression of conscious thought, writing must be regarded as another, equally complex, or even more so; and we are unable to understand why writing should not prove as much as the spoken word.

Moreover, in order to render this demonstration perfectly convincing, we will say, that there are patients in whom this second personality speaks, even in the state of wake. Here, at least if I consult my own experience, we have to do with entirely exceptional cases. Thus, I have seen three patients who, when we slightly pricked their insensible member, suddenly would complain in a loud voice, crying:

"You hurt me!" It was the second personality that spoke, for if we addressed the patient directly and called her by her own name, she would invariably declare that she had said nothing. I did not follow out the study of these curious phenomena, because at the beginning of my researches I did not know whether they were real or simulated. But M. Pierre Janet has observed similar ones under circumstances so precise, that now I no longer doubt their exactitude.

Here, accordingly, the second personality of the hysterical patient not only writes of its own accord, but speaks even. Shall we still maintain that this is an unconscious personality?

But this is not all. We know of even more convincing facts. We know of observations, in which this second personality, ever awake, is seen gradually to develop more and more, and to assume the initiative in conduct, instead of the first personality, which is temporarily annihilated. Such is the case of Felida, the interesting patient whose history M. Azam reported twenty years ago, which people at that epoch could not have been expected to understand, but at the present time is perfectly elucidated by all the data which in an abridged form we are placing before the reader. With Felida there occurred certain critical periods, as the effect of which her character would completely change and a part of her recollections would disappear; she passed into a new state—into her second condition, as M. Azam called it; this second condition, which would last weeks and even months, was connected by memory with her previous "second" conditions. Thus she would remember persons, whom she had seen in former "second" conditions, but she did not remember those whom

she had seen in the intervals. Thus there was developed within the patient a real double personality, not co-existent, but successive.

The facts above set forth have led me to the assumption that there may exist in hysterical patients two rational faculties, that are mutually ignorant of each other. I do not regard this as a simple hypothesis; it is an induction, in my opinion perfectly legitimate.

To me it seems difficult, upon the occasion of every case examined and every movement produced in the anæsthetic member, to declare whether the movement in question is accompanied by consciousness; the criterion which we employ is too uncertain to be everywhere applied with infallibility. But I believe it satisfactorily established in a general way, that two states of consciousness, not known to each other, can co-exist in the mind of an hysterical patient.*

We discover at once the psychological conclusion to be drawn from the preceding experiments; namely, that the limits of introspection are not those of consciousness; and that where we have not consciousness, there is not necessarily unconsciousness. Such are the very important and very curious facts that to me seem destined to reconstruct the theory of the unconscious.

* I cannot adduce here all the arguments upon which my position is based. I shall only refer, in this note, to the interesting researches of M. Pierre Janet upon "systematic anæsthesia."

THE GRAPHIC METHOD AND THE DOUBLING OF CONSCIOUSNESS.

PSYCHOLOGISTS, in the last few years, have come by many different ways to establish the fact that in hysterical patients a plurality of persons exists. The curious observation, for example, of Doctor Azam, of Bordeaux, may be recalled, where a young woman, by the name of Férida, manifestly hysterical, presented two successive lives in which she possessed neither the same character nor had the same recollections.* Azam's observation does not stand alone. There are others recorded, very many in fact, of the same kind; as for instance that of Doctor Dufay. In his "Diseases of Personality," M. Ribot has given a complete history of this interesting question.

The experiments that we presented in a former series of articles on this subject, and the similar experiments of M. Pierre Janet, accordingly, set forth nothing new. We have simply found a method of revealing in the majority of persons afflicted with hysteria those remarkable phenomena of duplication which hitherto seemed somewhat exceptional. We have established, almost with certainty in fact, that in such subjects there exists side by side with the principal personality a secondary personality, which is un-

*Azam, *Double Conscience*, etc.: J. B. Baillière, Paris.

known by the first, which sees, hears, reflects, reasons, and acts.

In following out our study of the methods that enable us to reveal this hidden personality, we are now to have recourse to the so-called graphic method, the employment of which, at first restricted to the work-rooms of physiology, seems, at the present time, destined to find its way into the current practice of medicine.

The principle upon which this method works, consists, as we know, in the transmission of the movement we desire to study, to a lever the pointed extremity of which writes upon a revolving cylinder. The transmission of the movement to the lever may be effected by various means, the simplest of which is a rubber-tube having communication with an expansible chamber, which moves the lever. Every pressure exerted upon the rubber will be transmitted to the lever by the column of air enclosed within the tube, and thus trace a line upon the cylinder. This line presents various characteristics to be noted. When the lever is at rest, and no movement is transmitted to it, the line that it traces is perfectly rectilinear; if, on the contrary, it receives a pressure, it will trace a curve more or less uneven, which will rise above the line traced when at rest, designated the line of abscissas. This curve, by the height to which it rises above the line of abscissas, will indicate the amplitude of the movement; by its length upon the cylinder, of which we know the velocity of rotation, it will indicate, and that with absolute precision, the rapidity of the movement; and finally, its form will indicate the form of the movement. This, in few words, is the principle of the wonderful method that has given a new status to the physiology of movement.

How may this method be applied to the study of the doubling of consciousness? How are we to get a line that will exhibit a relation to this disorder of the mind? The question was put to me by several psychologists to whom I had discovered the present subject of my investigations. But the difficulty is at once removed when we reflect that each separate personality can be brought to execute movements, and that these movements can be registered.

For example, we have an hysterical patient, hemi-anæsthetical on the left side; her name is P. S——, and she will be the subject of the experiments the description of which is to follow. She is a young girl, twenty years of age, tall, well-developed, intelligent, and of a serious disposition, yet who is subject to dreadful convulsive attacks and in the intervals of these attacks, to delirious crises. We shall study her during one of these intervals of repose. With her, the movements of the second personality which are commonly called “automatic writing,” are highly developed in the insensible portion of her body; thus, if we tell her to think of a number, her anæsthetic hand will be seen to execute movements in connection with the number thought of; if we tell her to count the beats of a metronome, her hand, while she is counting, will be seen gently to keep time. These different movements are performed without the participation of will, or even of consciousness on her part; they may be called, if we choose, automatic movements, but it is not to be forgotten that they are extremely complex, and that it would be improper to liken them to simple reflex motions. We return, here, to an important question that we have touched upon in our first article. Repetition, perhaps, is necessary. We said there that

the movements performed by the anæsthetic member under the influence of an idea, sometimes exhibit all the marks of a movement that is intellectual, the result of a reflective act and of volition. One of the proofs that may be given of this, is, that with our patient P. S—— the application of a recording instrument to the anæsthetic member greatly increases the intensity of the movements; and that when the instrument is taken away they slacken, without, however, completely disappearing. Furthermore, the form of the movement varies with the form of the apparatus applied. If we simply place a pencil in the insensible hand while the subject is thinking of the number 5, she will write 5; if we place a dynamograph in her hand, she will press five times; if a myographic drum be used, which is an arrangement to measure muscular dilatation, and if that apparatus be applied to the forearm, the forearm performs a movement. In short, there is in all these cases an intelligent adaptation to the form of the apparatus used. If still other facts be required to demonstrate the complex nature of the movements in question, we may say that they are not produced at the outset in all patients; but it is necessary to wait for a time—for example, to strike the metronome with regularity some several minutes in succession, in order that the second personality which has control of these movements may comprehend what is wanted of it, and execute the same. Thus, for example, if during an experiment a key be let fall upon the table, the subject will not at once perform an automatic movement; but if the key be let fall at equal intervals, or if we regularly strike a metronome, a moment will arrive when the movements will be produced and when they will regulate their rhythm to keep time with the sound

heard. Sometimes, even, it happens that when the metronome is suddenly stopped, the subject, not being warned of our intention, continues to produce an automatic movement or semi-contraction.

These few facts suffice to show us, that the involuntary and unconscious movements an hysterical subject performs when under the influence of a predominant idea or upon hearing the beats of a metronome, reveal a directive process of reasoning and a directive volition. They are voluntary movements on the part of the second personality of the patient.

These movements are, as we have already remarked, greatly stimulated by the application of an instrument to receive them, and I have witnessed them produced in almost every instance in which I have applied such an instrument. The respiratory movements in particular, when the subject thinks of a number, or hears the beats of the metronome, can change rhythm; further, according as the experiment is prolonged, the movements increase progressively in intensity.

After these few preliminary remarks, I have now only to bring before the eyes of my readers the tracings that I have taken with the patient P. S—, and which are reproduced, with necessary explanations, on the accompanying pages.

These tracings were all taken, without interruption, in the course of a single experiment, and without any alteration having been made in the apparatus, which remained in its place. A myographic drum was applied to each forearm. It will be remembered that the right side of P. S— is insensible; the comparison of the reactions produced in both sides of the body can accordingly serve for showing the influence of anæsthesia upon the so-called automatic movements.

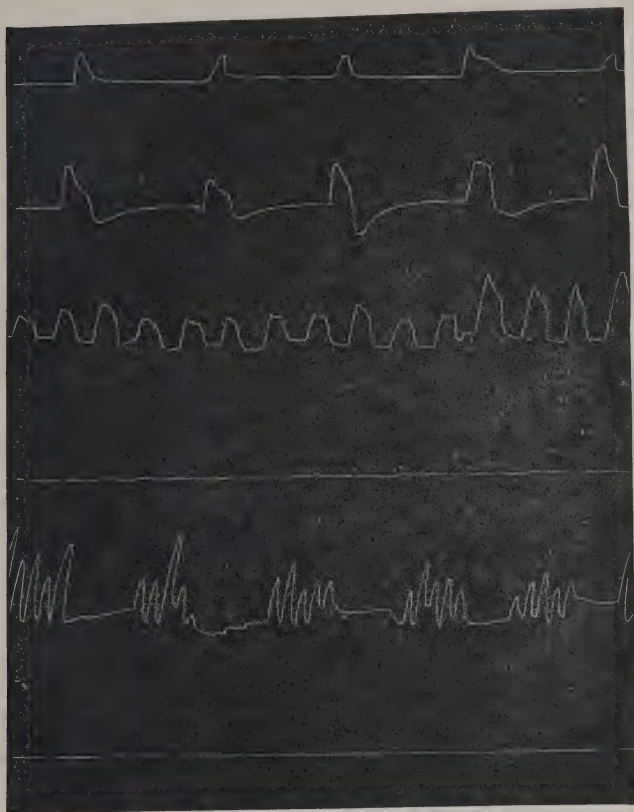


FIG. 1.—Experiment with P. S—, hemianæsthetical, on the right side. The first line traced, beginning at the top, represents the voluntary contractions of the right, insensible arm. The second line traced represents the voluntary contractions of the left, sensible arm. Both were taken at the same time. The third line represents the automatic movements of the right, insensible arm during the beats of a metronome; the fourth line corresponds to the left, sensible arm during the same experiment. The fifth tracing represents the automatic movements of the right, insensible arm while the subject is thinking of the number 5; the sixth line corresponds to the left, sensible arm during the same experiment. The lines are to be read from left to right. Minimum velocity of cylinder.

We begin by asking the subject to press both hands energetically, then to open them, his eyes all the while being closed ; we thus obtain the two first lines of the first figure ; the first line belongs to the right, anæsthetic arm, and the second to the left, sensible arm ; we may collect therefrom the following differences : the movement of the anæsthetic hand is behind that of the other hand ; the height of the curve is less ; the line of ascension is more inclined.*

Now, let us ask the subject to make no movement whatever, to remain completely immobile, and to listen attentively to the beats of a metronome : the third line traced, of the figure, corresponds to the right, anæsthetic arm, which, without the knowledge of the subject, executes clearly-defined movements, in rhythmic adaption to the beats of the metronome ; in the fourth line, on the contrary, which corresponds to the left, sensible member, scarcely anything is produced.

Let us stop the metronome, and ask the subject to remain very quiet and, with both eyes closed, to think of the number 5. The right hand then begins, without the knowledge of the subject, to perform movements very clearly indicated in the fifth tracing of our first figure, while the left, sensible hand remains almost immobile, as shown by the sixth and last line marked.

Accordingly, the first figure shows us, with perfect evidence, that if the two, sensible and insensible, arms, of P. S—— be explored at the same time, the voluntary contractions will be stronger in the sensible member, and the automatic contractions, or those of the second personality, stronger in the anæsthetic member. This result, which we have similarly ob-

*On this point, I may refer to my last publication : *Les Mouvements volontaires dans l'Anesthésie hystérique*. *Revue Philosophique*, 1889.

tained with another subject, appears to uphold the conclusion that the second personality has chosen, as the seat of its operation, the insensible regions of the body.

This result, we once more remark, is obtained only when we make simultaneously a bilateral exploration. Other tracings, which we have deemed unnecessary to publish, clearly show that the automatic contractions of the sensible member are very much stronger when no apparatus is during the same time applied to the other arm. In this case, as a matter of fact, the second personality brings its attention especially to bear upon the region of the body where the experiment is being made ; whereas, if it is obliged in some way, to concern itself with both arms at the same time, it prefers to take charge of the movements of the anæsthetic arm. This common comparison is employed in order to render a highly delicate fact clearly intelligible. It is certain that what we designate by a convenient term the second personality, is a complex synthesis of psychological elements, and that this synthesis, according to circumstances, is now constructed, now destroyed, now enlarged, and now diminished. It is understandable, how attention, practice, and repetition can aid the development of this synthesis ; which is the case, when, in proportion as the experiment is protracted, the movements become more and more extended. This fact, moreover, can be observed with the majority of the lines traced, by running over them from left to right, in the directions in which they have been recorded.

Such are the many important facts bearing upon the psychological history of the double personality ; and these facts are to be accurately ascertained only by the regular application of the graphic method.

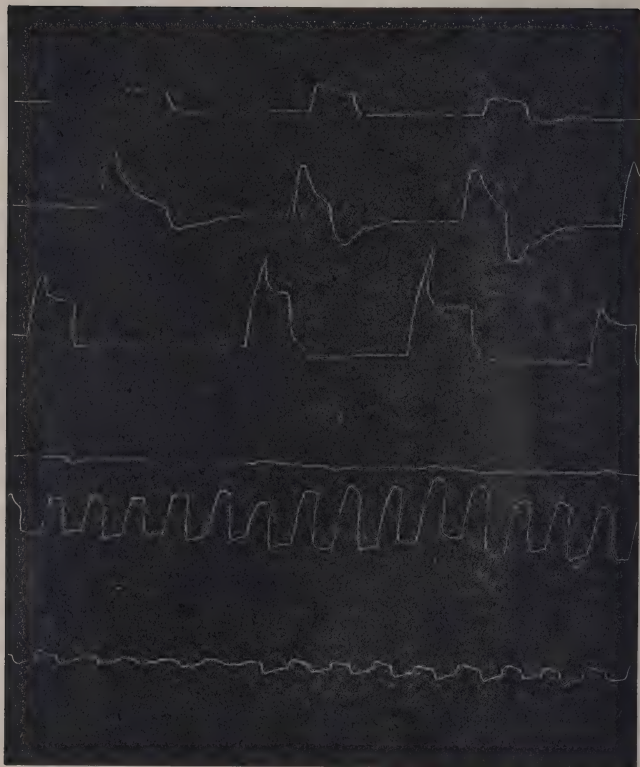


FIG. 2.—Experiment upon P. S—, hemianæsthetic, on the right side. Lines 1 and 2 are a repetition of the experiment recorded by lines 1 and 2 of the first figure. Line 3 corresponds to voluntary contractions of the right, anæsthetic arm after paralysis of the left, at first sensible, arm. Line 4 corresponds to the left, paralyzed arm. Line 5 represents the automatic movements of the right arm, and line 6, taken at the same time, represents the automatic movements of the paralyzed left arm, while the patient is listening to the beats of the metronome. The lines are to be read from left to right. Minimum velocity of cylinder.

This method contains still another lesson for us. Glance at the figures 2 and 3. The lines traced were taken, during the same experiment of course, after having effected by suggestion a paralysis of movement and of sensibility in the left half of the body, which was previously sensible and capable of movement. The changes produced at once strike the eye.

Beginning at the top, the two first lines of figure 2 are taken before the experiment of suggestion. The first line is produced by the voluntary contractions of the right, anæsthetic hand, and the second line by the simultaneous voluntary contractions of the left, sensible hand. It is the repetition, pure and simple, of the two first lines of the first figure. Then intervenes the suggestion producing paralysis. When the paralysis of the left member is complete, the subject is again asked to squeeze strongly his two fists; the voluntary contractions of the right arm have increased in energy; those of the left, anæsthetic arm are scarcely perceptible, and, furthermore, they are behind, as will be seen from a comparison of lines 3 and 4 of fig. 2.

Now we set our metronome a going. The automatic movements of the right member remain almost what they were before the experiment of paralysis (line 5 of fig. 2, and line 1 of fig. 3); by way of compensation, however, those of the left member which were imperceptible before the experiment when the member was sensible and capable of movement, become very distinct (line 6 of fig. 2, and line 2 of fig. 3). Similarly, when the subject thinks of the number 3, the movements are at the same time considerable in the right, anæsthetic member (line 3, fig. 3) and in the left, anæsthetic member (line 4, fig. 3).

If we seek to collect the signification of these trac-

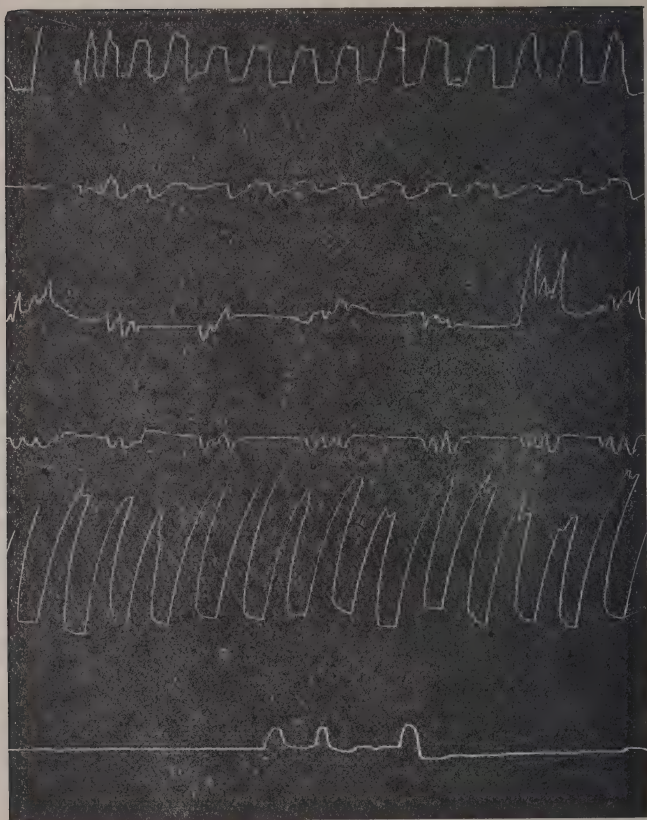


FIG. 3.—Experiment with P. S—, hemianæsthetic, on the right side. Lines 1 and 2 are a repetition of the experiment recorded by the tracings 5 and 6 of the second figure. Line 3 corresponds to the automatic movements of the right arm while the subject is thinking of the number 3. Line 4, taken simultaneously, corresponds to the automatic movements of the left, paralyzed arm. Lines 5 and 6 were taken after the suppression of the paralysis and while the subject was listening to the beats of the metronome; line 5 corresponds to the right, anæsthetic arm, and line 6 to the left arm, again become sensible. The lines are to be read from left to right. Minimum velocity of cylinder.

ings, we shall see, in effect, that when suggestion has stricken the left member with paralysis, which previously continued sensible, two simultaneous facts are produced: its voluntary activity has diminished in intensity, to the extent that the voluntary contractions are hardly perceptible, and at the same time its automatic activity has increased correspondingly, as though there were a sort of antagonism between the two functions. In other words, by creating anæsthesia through suggestion in a region of the body, the province of the second personality has been extended.

But it is curious to remark that the field of action of this second personality is always limited; it cannot simultaneously produce movements equally precise in the right and left members. For instance, when the subject thinks of the number 3, one arm will better express by its movements the figure thought of, than the other (cf. line 3 and 4 of fig. 3); as if the attention of the second personality could not be brought to bear at the same time upon both arms. This is another circumstance that the graphic method alone could reveal.

We shall confine ourselves to these few summary observations. It is not our intention to linger over the detailed description of experimental facts, but only to point out the principle of a new method adapted to the scientific study of automatic writing and analogous phenomena. It is much to be desired that those who have occasion to study automatic writing in normal persons, or in those who pretend to be such, will subject the movements performed by these individuals to the control of the graphic method.

THE INTENSITY OF SUB-CONSCIOUS STATES.

IN this new chapter of our study of the doubling of consciousness I propose to enter upon an exceedingly delicate problem, and one that is of the greatest importance to psychology. At the Paris Congress of Physiological Psychology recently, I raised a discussion upon the subject in question, and for the benefit of the readers of this review, I now desire again to set forth the opinion I hold and the experiments I have instituted; at the same time profiting by the various remarks and objections that have been addressed to me by other physiologists.

The problem that I seek to solve is, to understand how and why in hysterical patients a division of consciousness takes place. Not to present the question in too abstract a form, I shall recall to mind a few experiments that once again may better convey the idea of what this so-called doubling of consciousness really is.

We have repeatedly seen that in hysterical anæsthesia sensation is preserved and may reappear in a secondary consciousness, distinct from the principal consciousness. The observations that we have hitherto published related to the sense of touch. We showed, in this way, that an anæsthetic hand, hidden behind a screen, would take a pen or pair of scissors, which had been brought into contact with it, and with these

several objects would perform various intelligent movements ; which proved not only that the contact of the objects in question had been perceived, but that even their nature and functions had been recognized. To these observations we are now able to add still others, which show, that also the sensation of pain may be preserved. Two subjects I observed revealed in one half of their bodies a total insensibility to punctures, pressure, burning,—in short, to the most varied kinds of painful sensations ; but when we put a lighted match into the anæsthetic hand, the fingers would draw back from the flame in proportion as the latter advanced, and would finally relax, allowing the match to fall to the ground. Pain caused by burning, accordingly, is actually felt in an apparently anæsthetic limb ; there even existed, it seemed, a certain prevision of pain and corresponding defensive movements ; yet all this did not reach the principal consciousness of the subject ; the sensations and movements of the anæsthetic limb, by grouping themselves together, formed a secondary consciousness, which in its development did not amalgamate with the main consciousness. I must add, that, according to my own experience, it is less easy to impress on the anæsthetic regions a sensation of pain than a sensation of touch ; with most subjects the anæsthetic hand which is able to adjust itself in adaptation to familiar objects, does not seem to feel the sensation of pain caused by a burning match, and does not perform any defensive movement to avoid it.

I trust that the details given in regard to the division of consciousness in hysterical subjects, will suffice to impart a perceptible form to the problem that we are endeavoring to solve. That problem is, to find out why sensations provoked in an anæsthetic region do

not reach the principal consciousness of the patient; indeed, our wonder is all the greater that the sensations in question should be perceived by another ego, and should provoke appropriate movements. In other words, the question we ask is, what are the psychophysiological conditions that determine the formation of a second consciousness? Having put the question before the reader, we shall, for the sake of greater clearness, at once point out the solution we propose.

It is a matter of observation, as we shall presently show, that if among sensations belonging to the same organ of sense, (for example, to touch or to sight,) some belong to one consciousness and others to a different consciousness, there will exist among such sensations a difference of intensity. We are unable in cases of hemi-anæsthesia to demonstrate this fact directly; for it is utterly impossible to compare with one another, from the point of view of intensity, the tactile sensations of any two, sensible and insensible, parts of a body; because each of the consciousnesses knows but one of these two groups of sensations. We may, however, take a roundabout way, and resort to an artifice based upon the following fact, that in cases in which the hysterical patient presents an approximatively regular hemi-anæsthesia, the organs of sense situated in the insensible half will share the anæsthesia to a less degree than the skin will; thus, the eye may reveal a loss of the perception of certain colors, or a concentrical contraction of the normal field of colors. It is, accordingly, possible to institute comparative experiments upon the sensibility of the healthy eye, and likewise upon that of the eye on the anæsthetic side, with the view of ascertaining whether the sensations caused in both eyes by a same

excitant exhibit differences of quality or of intensity. The two following experiments seem to furnish an answer to this question.

M. Charpentier has demonstrated, that a minimum of perceptible color exists, depending upon the extent of the stimulated part of the retina. The same fact is verified in the hysterical patient, yet on a much exaggerated scale, for in order that an hysterical person may be able to perceive a color, the colored surface must be larger than is required for the normal eye. Now, it is highly important to be able to establish that the chromatic minimum is not the same for both eyes. Let us take an example. To perform the experiments, it is not necessary to employ pure colors, since the main fact of importance lies in the comparison of the two eyes. Thus, in the case of Dem . . . , a hemi-anæsthetical patient on the right side, a piece of red paper, to be perceived as such by the right anæsthetical eye, had to be at least six millimetres square, while in the case of the left eye two millimetres square is a sufficient size. It is thus seen that the quantity of excitation necessary for the production of the sensation of red is not the same for both eyes. This is not a matter of interpretation, but the actual fact itself; whence, it appears, we may conclude with a certain degree of probability, that if to both eyes we apply one and the same excitant, the sensation produced on the sensible side will possess a greater intensity than that produced on the anæsthetical side.*

A second experiment, likewise performed upon the sense of vision, yields a result which, in my opinion,

* M. Parinaud, director of the ophthalmoscopic department at the "Salpêtrière," has verified the same fact in a slightly different form. (*Anesthésie de la rétine*, Bruxelles, 1886.)

leads to an analogous interpretation. We know that when we present simultaneously to each of both eyes two surfaces representing different colors, there is provoked what is called a conflict, an antagonism of the visual field. If, for example, we present to the right eye a red back-ground, and to the left eye a green one, the observer will perceive a field which seems alternately red and green. I have attempted to reproduce this experiment with hysterical subjects, by employing certain colored glasses, that have kindly been lent me by M. Ch. Henry. I have used only glasses the color of which my patients could perceive with both eyes. In hemi-anæsthetic hysterical subjects, submitted to my investigation, I have established the fact, that there is not produced a concurrence of the visual fields, as in normal individuals ; the color placed before the eye of the sensible side is the only one perceived. If, for example, into the frame of a pair of spectacles we insert a red glass and a green glass, which are almost complementary and, when superposed, extinguish each other, the subject will only perceive the color of the glass placed before the eye of greater sensibility ; he thus only perceives red in the one instance, and green in the other. Like the former example, this new experiment seems to me to demonstrate, that, given an equal degree of excitation, the sensations of the sensible eye will present a greater intensity than those of the anæsthetic eye.

This conclusion might be further strengthened by researches that I have recently made with reference to the times of reaction in visual excitations. The times are longer when the excitation is performed upon the anæsthetic eye ; which seems again to prove, that the sensation of this eye, for any one excitation, is of a

less intensity than that of the sensible eye. M. Féré has made observations on the times of reaction to tactile excitations, in cases of incomplete anæsthesias of the skin, and has obtained similar results.

In the researches of which I have just given a condensed exposition, we have hitherto compared the sensations produced in a sensible region and those produced in an anæsthetic region from the point of view of intensity only. If the conclusion derived—although provisorily—from these first researches is correct, we ought to be able to generalize it, and to assume in advance, that if we progressively diminish the intensity of an excitant that acts upon the more sensible organ, there must arrive a point at which the sensation is sufficiently diminished in intensity as no longer to form a part of the secondary consciousness, but become sub-conscious, as are the sensations of the anæsthetic regions.

And experiments, indeed, completely confirm this prediction. Here again we are by preference referred to visual excitants, in order, as far as possible, to obtain precise and mensurable results.

We have, in fact, already discussed the experiment required, in our study of the hysterical eye,—for which see page 30 et seqq. We have seen, that if we place an hysterical person before a graduated scale of letters, the writing of the insensible hand, unknown to the subject, is able to reproduce diminutive letters that the subject himself cannot see. Now, it is easy to establish here, that a difference of intensity exists between the sensations forming part of the two consciousnesses.

The word intensity, I well know, has, when applied to sensations, a rather uncertain sense. But we call attention to the fact, that the intensity of visual sen-

sation here corresponds to an objective fact, susceptible of measurement—the size, namely, of the retinal image; and all things being otherwise equal, it is allowable to say, that to the largest retinal image corresponds the most intense visual sensation. Now, just as when we diminish the retinal image—through the choice of ever smaller letters—a point arrives where the size of the image becomes insufficient to allow of reading, but nevertheless is sufficient to determine automatic writing, it is manifest, that the principal difference existing in this case between the sensations of the two consciousnesses, is a difference of intensity.

This second series of experiments reaches, we see, the same conclusion as the former. We shall presently expound still others, which belong to an entirely different order.

Among the most curious and important facts that have recently been discovered in the domain of physiological psychology, we must mention the phenomena of dynamogeny, as produced in hyperexcitable subjects under the influence of peripheral excitations, that is to say, of sensations of every kind. M. Féré, who long has studied these dynamogenetic actions of sensations, has demonstrated that they make themselves felt not only upon the movements, but upon the sensibility, upon circulation and the other physiological functions.*

These psycho-mechanical experiments can furnish a fresh argument in support of the thesis we advance; showing, that if the sensations we provoke in an anæsthetic limb, do not reach as far as the principal consciousness of the subject, it is caused by lack of intensity. In fact, when we subject the limb or the in-

* *Sensation et Mouvement*. Paris: Félix Alcan.

sensible region to the influence of a dynamogenetic agent, as a magnet or to electricity, the sensations provoked in this limb become conscious according as the power of dynamometric pressure is increased ; there is, accordingly, probably produced the same augmentation of intensity in the psycho-sensorial process, as in the psycho-motory process.

If there remained any doubt in regard to the preceding interpretation, such doubts, I trust, would be destroyed by the recital of a somewhat complex experiment upon the visual organ, which I have performed upon several patients, and notably with L. L——. Let us again place this subject before the black-board with its scale of written letters. The patient's visual acuity, as previously stated, is equal to 0·5 : the visual acuity, revealed by the automatic writing, is a trifle higher, it is equal to 0·75. If, while the subject is attempting to decipher the letters, we subject him to a dynamogenetic excitation, such as a simple pressure upon the anæsthetic hand, the visual acuity of the conscious subject increases, it becomes equal to 0·75, and, consequently, equal to that which guides the automatic writing. We are able to interpret this first result by asserting, that peripheral excitation renders conscious to the principal subject certain visual sensations, in that it augments their intensity.

But the most curious fact that occurs in this experiment is the following. This same dynamogenetic excitation exerts its influence upon the visual acuity that is in connection with the automatic writing. The measurement of this visual acuity shows even, that it can become equal to unity, namely, to that of a normal eye ; the acuity of conscious perception remains less, and only attains 0·75.

It is really interesting to note, that a given peripheral excitation, which suffices to provoke automatic writing, is not competent to provoke the conscious perception of the principal ego. In other words, a degree of sensorial intensity sufficient to provoke automatic writing, does not suffice to provoke conscious perception ; which proves once again, that there exists a difference of intensity between the psychological phenomena of the two consciousnesses.

All the experiments above expounded are susceptible of a very simple counter-proof. Up to this point we have seen, that in most cases we are able to render a sensation sub-conscious, by diminishing the quantity of excitation, or, inversely, to render a sensation conscious by augmenting the quantity of excitation. We have not operated directly upon the element of consciousness.

Hypnotic suggestion enables us to modify this element, to suppress it when it exists, or to create it, when it is lacking. By this means we are able to ascertain whether the conscious phenomenon corresponds to a definitely determined degree of intensity of the physiological phenomenon that serves as its foundation. Upon this point, I have performed, in association with M. Féré, an experiment which seems to me decisive. The experiment in question was conducted with an hypnotisable, hysterical woman, who when she voluntarily pressed the dynamometer in the state of rest indicated on it the number 20, and when she pressed the instrument while looking at a red-colored surface, the cipher 40. With this subject an hypnotic suggestion suppresses for a moment the conscious vision of the red. Again, invited to press the dynamometer, while looking at the red surface, which to the subject

seems grey, she no longer indicates 40, but a number slightly higher than her normal figure. This experiment demonstrates to us, that the suppression of consciousness is equivalent to a diminution of intensity in the corresponding physiological process.

And this conclusion, which we have already reached a number of times, seems to me to deserve an earnest consideration ; but, in order to be well understood, it needs to be made precise. In short, the experiments that we have recapitulated only seem to prove one thing, *viz.* : that a sensation having been given, whether visual, tactile, auditive or other, if we diminish its intensity, it is no longer perceived by the principal consciousness, but may be discovered in a secondary consciousness. A difference of intensity, accordingly, can serve to explain how a tactile sensation *a* belongs to the first consciousness, and a tactile sensation *b* belongs to the second.

But, when the sensations are of a different class, this comparison of intensity becomes altogether insufficient. Thus, there are subjects who will perceive an electric current in a member where they have lost the sensation of mechanical pressure, or of puncture, of heat, or of cold. Evidently we cannot explain this disassociation by saying that electric sensation is more intense than other sensations, because frequently the very subjects that are insensible to the strongest punctures, are able to feel even the faintest galvanic current, and moreover no standard of comparison is really possible between things that are so widely different. But let us call attention to the fact, that if the explanation we have proposed, encounters at this point a limit,—a fact which merely proves that it is not general,—nevertheless, we are able to establish that the notion of

quantity and of intensity maintains its importance, even in experiments of the kind referred to. There are, in fact, many hysterical subjects who do not perceive the electrical excitation at the first instant it is applied to the insensible skin ; but if the excitation is continued for a few moments, it most frequently happens that sensibility to the electrical current will be aroused under the form of a painful sensation ; which proves beyond question, that a certain quantity of electrical excitation is needed in order to arouse conscious sensation, and that quality is not the paramount factor:

In conclusion I shall emphasize a psychological aspect, which appears to me of a certain importance.* I do not believe that a difference of intensity between two sensations of the same sense *ipso facto* justifies their distribution into two different consciousnesses. It is further necessary, that the sensation, however faint, should not possess an interest, a practical importance that might attract the attention of the subject, and by that very fact augment the intensity of the sensation in question.

The hysterical subject, as I, with many other observers, conceive him, is an exhausted subject. The slightest effort is painful to him, and he thus seeks to husband his forces. Like all of us, he experiences a vast number of sensations, differing both in their intensity and quality. He makes a selection from among all these sensations, because he finds it too fatiguing to perceive them all. Generally speaking, he more carefully preserves visual sensations than tactile sensations, because he can less easily dispense with the

*M. Pierre Janet, à propos of my communication to the Paris Congress had advanced an opinion which closely agrees with the one I set forth.

former ; and in a given order of sensations, he preserves the most intense sensations, because the latter are perceived with the least effort of adaptation of the sensory organ. Such, in my opinion, is the rather indirect rôle of the intensity of sensation in the division of consciousness.

It is because feeble sensations are difficult to collect and to arrange, because they exact greater attention and greater effort, that the subject neglects them and that they form secondary consciousnesses. The division of consciousness, it seems to me, is chiefly explainable by the mental habitudes peculiar to the individual.

THE ROLE OF SUGGESTION IN PHENOMENA OF DOUBLE CONSCIOUSNESS.

WE shall conclude our investigation of the subject of double consciousness, by attempting to define accurately the relations existing between the phenomena treated of and those of suggestion. The subject of suggestion has been extensively and carefully studied, of late years, in France. At the present day, the facts of this department are the best known and the least discussed. They are daily reproduced in our hospitals upon subjects of the most diverse characters; and they will undoubtedly soon take their place in the current practice of medicine. Some writers, of a type of mind too prone to generalization, have exaggerated the importance of suggestion, and are determined to find suggestion at every turn; they have asserted even, that suggestion is the sole cause and key of all physical and moral phenomena capable of being provoked in hypnotized subjects.

Owing to repeated experiments, it is comparatively easy to give a fairly precise definition of suggestion; and such a definition is absolutely necessary if we desire to avoid the error committed by many writers who have come to explain everything by suggestion only because they confound under this convenient term things that are quite different. First of all, suggestion implies, in the majority of cases, the setting into ac-

tivity of the intellect of the subject ; it is pre-eminently a psychological phenomenon. When a hypnotized subject, for example, is told that there is a snake or a bird in front of him, and when, following thereupon, he fancies he sees a serpent crawling at his feet, or a bird flying in the air, this constitutes a suggestion, for, to provoke the hallucination, an appeal has been made to the intellect of the patient. The same result may be reached without making use of words to convey to the subject the thought in question : oftentimes a simple gesture, a sign, an attitude, or even the form of the experiment, are sufficient to apprise the subject of what the experimenter wishes ; and the thought that the latter has in mind is often hit upon and carried into execution by the subject with a rapidity and a sagacity that are astonishing. In this phenomenon we come upon one of the greatest obstacles and one of the most easily committed errors attending psychological experiments with hypnotized subjects.

A second feature of suggestion, at least in the majority of cases, is the assumption of an influence exerted by one person upon another. The subject of the suggestion is at the orders of the experimenter ; he listens, he appropriates the latter's thought, he feels everything the experimenter desires him to feel, obeys every wish and every caprice the experimenter entertains. The instances of resistance offered, frequently met with, are evidence of incomplete hypnotization or of incomplete suggestion. Of the observations that firmly establish this passive obedience on the part of the subject, I shall cite that of M. Richet which I deem very remarkable. The experiment was conducted with one of his friends, whom, after having been put to sleep, M. Richet compelled to pick up, twenty times in suc-

cession, a piece of chalk that he kept throwing under the table.

Such is what contemporary authors understand by suggestion. The notion currently entertained thereof may be explained by putting it into such a form as this, namely, that it is the setting into activity of the intellect of a subject by another person, who exerts upon the subject a power more or less absolute.

I have no hesitation in declaring, for my part, that a definition of this sort is beyond question insufficient and that it would be unsafe to accept it; it is much too broad; it comprehends too many facts; it comprises, in effect, all psychology, and on this score every psychological phenomenon becomes a phase of suggestion—a state of affairs that would divest words of their worth and complicate all questions involved. With a very few authors, among them M. Pierre Janet for example, I hold that we must restrict the term suggestion to cases, precisely determined, in which a subject carries into effect a given phenomenon because he has previously had the idea of it. He has conceived the phenomenon, he has willed it, or at least he has given it his adhesion, and he carries it out. Such is suggestion. For example, we tell him to steal a handkerchief; he understands what we require of him, and does it. Or perhaps, we tell him that his picture is drawn upon a sheet of white paper; he understands what is told him, he represents to himself the portrait and believes he sees it. In all these cases, we establish, when we analyze them, the fact that the subject is conscious of the end that he pursues and that the experimenter has indicated it to him.

A psychologist will have no difficulty in recognizing that suggestion, understood in the sense last indicated,

pre-supposes a great number of intellectual elements. It appeals, in the first place, to the functions of perception, then to the functions of ideation, of comprehension ; the entire intelligence can, in certain cases, intervene in the shape of reasoning, of memory, and of imagination ; and finally, the will, the emotions, the entire personality of the subject may play a part in it, be it by engaging in the suggestion, be it through modifying the same, or in opposing it. Suggestion clearly represents an intellectual activity that is extremely elevated and complex.

But it is plain that all the manifestations of the mind can not be referred to a phenomenon of this kind, as type. Every one possesses, within the sphere of his psychological life, acts of a more simple, of a more elementary order ; and these more elementary acts must, in hypnotized subjects, plainly be retained. The following are instances of such acts. If some one sharply strike our knee, at the tendon just below the cap, while our legs are crossed, we will suddenly lift and extend the leg outward ; if a person, behind us, strike, unawares, a vigorous blow with a stick upon a Chinese gong, we will be stunned by the deafening sound for which we were unprepared, and will make a gesture of surprise or of fright, or we will give forth a cry. We have here, it may be said, elementary psychological phenomena ; which do not contain a trace of suggestion, for we have not had the idea or the intention of making a movement of our leg before receiving the blow at the knee, or the idea of crying out before having heard the noise made by the gong. Now the fact that these phenomena are produced in hypnotized subjects is no reason that they should alter in

character, and we believe, accordingly, that suggestion does not comprehend all psychological phenomena.

The reader is now well enough acquainted with the subject to understand why it is insufficient to explain everything that takes place in hypnotized subjects by invoking the hackneyed term suggestion. "Suggestion," people say. And that suffices for all purposes, that explains everything, and like the panacea of the ancients it cures everything. As a matter of fact, theories of suggestion, thus invoked, amount to nothing less than make-shifts to save people the trouble of serious and delicate investigation.

We have now come to the especial subject of our inquiries. Without doubt, we shall find here suggestion; but it is not suggestion that explains the division of consciousness in hysterical patients, at least the spontaneous division observable in persons affected with anæsthesia. Far from being the cause of the division of consciousness, it is its effect. This latter idea was first propounded by M. Pierre Janet, and appears to me eminently correct. A word will suffice to elucidate it.

Suggestion, when successful, consists of an idea impressed upon a person and reigning dominant in the consciousness of that person; reason, critical powers, and will are impotent to restrain it. If a subject believes he is holding a bird upon his knee, in consequence of the simple fact that I have told him so, the conclusion evidently is that he has lost the power of controlling, examining, and judging the ideas given him. For suggestion to develop itself, accordingly, it is necessary that the subject's field of consciousness do not contain too many antagonistic ideas. Now, it is exactly this psychological situation that is found realiz-

ed in the duplication of consciousness. As a consequence of such a phenomenon of bipartition, each of the consciousnesses occupies a more narrow and more limited field than if there existed one single consciousness containing all the ideas of the subject. This retrenchment of the field of consciousness constitutes what is called suggestibility.

We are able, to a certain extent, to test directly the exactitude of the interpretation indicated, by recurring anew to the experiments set forth in our previous articles. When an hysterical subject presents an anæsthesia of half of the body, the sensations received into that half form, as we have seen, a consciousness distinct from the principal consciousness. Now, in many subjects, this second consciousness appears to occupy a field of activity much more limited than the principal consciousness, for the suggestions given it are executed in a more automatic manner. For example, let us command the subject, that is to say, the principal consciousness, to take a pen and to write his name ; perhaps the subject will obey our injunction, but it is also possible that he will resist it, and that in the waking state he will be very slightly susceptible to suggestion ; the field of his consciousness includes a certain number of antagonistic ideas against which a struggle must ensue, and over which victory is not always certain. But the case is quite different when, without saying a word to the subject, we slip a pen into his anæsthetic hand, and make him trace a word behind a screen ; the anæsthetic hand, in the majority of subjects, does not hesitate to re-write the word ; indeed, it will write it successively a great many times—proving the limited power of initiative of the impoverished consciousness that receives the sensations of

the anæsthetic member. This incessant repetition of the same graphical movement has been discovered in several pathological cases, and the name of "verbigeration" has been given it. This absence of the power of initiative action is indeed so great that in the majority of subjects that I have studied, a suggestion of conduct or action through the intermediary agency of the anæsthetic hand could not possibly be effected. If we cause to be written by the anæsthetic hand the orders "Cough," "Sing," "Get up," the hand will reproduce automatically the order written, but the act suggested will not be carried into execution. This circumstance shows us that the phenomena of automatic imitation constitute an inferior psychological life.

M. Pierre Janet, whom I have frequently cited—for he has pushed his investigations very far upon this particular question and his conclusions often coincide with my own—has discovered an interesting method of utilizing this especial suggestibility produced by the division of consciousness. Although I have no inclination, on this occasion, to occupy myself with anything that relates to the practice of medicine, I may nevertheless point out that our researches in the province of psychology may in case of necessity possess a very great advantage for patients and contribute greatly to the treatment of their diseases.

Up to this point I have investigated only that division of consciousness that is spontaneous, that pre-exists in subjects before any sort of experiment is instituted. M. Janet has invented an ingenious means of effecting an artificial division; it consists in distracting the attention of the subject while some one is talking to him. For example, we take advantage of a

moment when the subject is chatting with some other person, or is absorbed perhaps in a fascinating book, to talk to him in a low voice ; whereupon a mental bipartition is produced ; one part of the subject's mind is conversing with the first-mentioned person, and another part with the second. Two distinct consciousnesses are thus formed, and each one is wholly occupied with the task before it. The suggestions that can be induced in this manner in a subject divided by distraction, are much more efficacious than direct suggestions ; they have, in addition, the advantage of being capable of accomplishment without it being necessary to put the subject to sleep, and we warmly recommend this class to all those who seek to alleviate the diseases of hysterical patients.

DOUBLE CONSCIOUSNESS IN HEALTH.*

THE preceding experiments have been made with hysterical 'subjects'. It has seemed to me useful to try if I could obtain analogous results in subjects that are normal—or nearly so, for, of course, the normal type has only an ideal existence. It is certain that, if we succeed in seizing in a healthy individual the least degree of the phenomena of duplication which are so developed in the hysterical, a solid basis will be given to the psychological study of double consciousness; each observer being put in a position to check all the facts advanced. I have made my investigations on five persons, who have been kind enough to submit themselves patiently to very long, very minute, and very monotonous experiments. So that, proceeding from the results obtained and set forth in the foregoing pages, we shall now endeavor to find out whether the phenomena of the duplication of consciousness are to be met with in non-hysterical subjects.

* * *

The persons on whom I have experimented are two ladies of fifty, a lady of thirty, and two of twenty-five years of age. One lady of fifty is ataxical; the lady of thirty is decidedly anæmic; otherwise, all of them enjoy good health. They have little intellectual cul-

* This article first appeared in *Mind*, No. LVII, from which with the permission of the publishers it has been reprinted.

ture, are completely ignorant of the aim of the experiments, and know, of course, nothing of researches on double consciousness or the like. I sat with each of them, on an average, six times, for three-quarters of an hour. The phenomena became gradually more marked, and without doubt would become still more so if the treatment were pushed farther. Lately I have attended to the question whether suggestible persons present a narrowing of the field of consciousness, that is to say, a difficulty in occupying themselves with several things at a time.* I think I may answer that it is not so with those of my subjects who present the most developed automatic phenomena; in fact, they can do at the same time very complicated things, for example, perform a mental addition, and squeeze, in series of five or six pressures, an india-rubber tube connected with a registering apparatus. I shall return to this question later on.

A word, first of all, on the experimental conditions selected. When experiments are made on an hysterical subject with an insensitive limb, it is relatively easy to submit that limb to excitations of which the subject has no consciousness. If, for example, it is the arm of the subject that is insensible, this is placed behind a screen, the skin is excited without the subject's perceiving the excitation, and the movements—often very intelligent—which the hand and the forearm execute in response to that excitation are produced outside the consciousness of the subject, and prove consequently that there exists in the subject a second consciousness.

But when the subject of the experiments has not the least insensibility, it is necessary to change the

* Pierre Janet, *L'Automatisme psychologique*, p. 456.

method. If his hand, placed behind the screen, is touched, he feels that it is touched, and the movement by which he responds to this sensation is equally conscious ; there is no double consciousness there. To evoke double consciousness, it is therefore necessary to render the subject insensible to the excitations brought to bear upon his limb, and, for that purpose, to distract him by occupying him otherwise ; distraction, as M. Pierre Janet has well shown, being a transitory anæsthesia.

I therefore requested my subjects—to whom, of course, no explanation was given of what was going to be done—to seat themselves before a table and leave their right hands to me, while I gave them something interesting to read. In these conditions one fact first showed itself which is worthy of remark. If the hand of one of my subjects was pricked while she was reading attentively, the sensation was less well perceived than when the subject, without looking at her hand, was told that she was going to be pricked and was prepared to receive the sensation ; for example, the separation necessary for the two points of a compass to be felt as double was greater in the first case. This, then, is anæsthesia by distraction ; it is fugitive, passing deceptive,—but it exists.

I could render it stronger by means of an artifice. Provoking different movements in the limb experimented on, I requested the subject to execute no movement, to leave her hand, for example, completely motionless and relaxed, and at the same time made her believe that it was I who, by slight pushes on the pencil or on the hand, made the latter move. Thanks to this little deception, the subject would pay no attention to those slight movements of her hand, but

attribute them to the experimenter. Evidently these (very delicate) psychological conditions will vary from one subject to another ; but for the moment we need take no account of the variations.

One of the experiments it appeared to me easiest to effect was that of the repetition of passive movements. A pencil being placed in the hand of the subject, who was attentively reading a journal, I made the hand trace a uniform movement, choosing that which it executes with most facility, for example, shadings or curls or little dots. Having communicated these movements for some minutes, I left the hand to itself quite gently ; the hand continued the movement a little. After three or four experiments the repetition of the movement became more perfect, and, with Mlle. G——, for example, at the fourth sitting the repetition was so distinct that the hand traced as many as eighty curls without stopping.

It is for the experimenter to choose with each subject the easiest kind of movement. I find that in general those movements are easiest that can be executed with a continuous stroke.

In the first experiments, when the hand had been successfully habituated to repeating a certain kind of movement—for example, curls—it was to this kind of movement that it had a tendency to return. If it was made to trace the figure *1* a hundred times and was afterwards left to itself, the stroke of the figure became rapidly modified, and turned into a curl. This shows well how rudimentary, as yet, was the motor memory that was being developed.

When any kind of movement had been well repeated, it could be reproduced without solicitation every time a pen was put in the subject's hand and

she fixed her attention on reading. But if the subject thought attentively of her hand, the movement stopped.

I have selected graphic movements because they are sufficiently delicate to be produced without awakening the attention of the subject, whereas movements of flexion and extension impressed upon the fingers or the wrist would with difficulty pass unperceived at the beginning of the experiments.

Movements of flexion and extension can nevertheless be developed, and I have ascertained that it is easier to get a total movement of the wrist repeated automatically than an isolated movement of flexion of one of the fingers.

When these movements of repetition become very distinct, they may come to be generalized and to appear in the other limb.

A second observation relates to the influence which the contact of the experimenter exercises on the hand experimented on. With a slight pressure I was able to make the hand go obediently in all directions, carrying the pen with it. This is not a simple mechanical compulsion, for a very feeble and very short contact is sufficient to bring on a very long movement of the hand. The phenomenon, I believe, can be approximated to a rudimentary suggestion by the sense of touch. Nothing is more curious than to see the hand of a person who is awake and thinks she is in full possession of herself implicitly obey the experimenter's orders. In these conditions there appears to me to be a partial hypnotisation.

It sometimes happens that the subject perceives these movements; but the perception is much less distinct than in the normal state. You can assure

yourself of this by requesting the subject to describe exactly the movement she has been made to execute.

The necessary condition for the preceding reactions is, that attention should not be fixed on the hand and what is taking place there. So far, I have realised this condition by making the subject attend to something else, *viz.*, reading, which is an intellectual operation, having nothing in common with the excitations that produce manual movements. Thanks to this artifice, the excitations,—for example, the contact of the experimenter or the passive movement impressed,—produced their full and entire effect on the psychomotor centres of the arm, without the attention and will of the subject interfering to modify the reactions.

Curiously, this result can be attained by quite opposite means. Instead of the attention of the subject being attracted elsewhere, it may be fixed on the particular excitations that are to set going the psychomotor mechanism of the hand.

The following is the clearest example that I have been able to establish. Place a metronome before the subject and set it in motion. Let the subject be requested to listen with the greatest attention to the hard sharp sound of the metronome, while the hand holds a pen. Pretty rapidly you can habituate the hand of the subject to trace with the pen little strokes that follow the rhythm of the metronome. Some persons even attain to doing it spontaneously.

In this experiment it is sufficient for the subject to listen with attention to the sound in order to cease to perceive the movements produced in the hand by the acoustic excitation. The excitation and the movement are nevertheless cause and effect. They are

two elements of the same psycho-motor process ; and *a priori* it might have been thought that the attention fixed on one of these elements should naturally extend to those associated with it.

Excitation of the movements of the hand may be produced not only by external sensations, but by ideas that strongly occupy the mind of the subject. If the subject thinks forcibly of a name or of a figure while holding a pen in the hand, and if the experimenter himself holds the hand of the subject it happens pretty often that the hand executes movements distinct enough for the experimenter to be able to divine his subject's thought. This is the phenomenon of automatic writing, which has been studied at length within the last years. I have nothing new to add, unless it be the remark that concentration of thought on a figure is sufficient to produce a state of distraction from the movements of the hand that is writing the figure.

The experiment with the metronome gives occasion for a remark as to the effect of attention on the intensity of sensations. As long as the subject listens to the beats of the metronome, the rhythmical movements of the hand go on. They become much feebler and may even cease completely if the subject is requested not to listen any longer, but to think of something else. This observation has already been made on hysterical subjects, and in much better conditions ; for the rhythmic movements of the hysterical subject's insensible limb are, as we have seen, so considerable that they translate themselves, when the subject holds an india-rubber tube, into pressures on the tube. We were therefore able to register these movements by the graphic method ; and the tracings obtained show that

there is a great difference in the extent of the contractions, according as the subject listens with attention to the sound of the metronome or tries not to hear it.

This experiment on the hysterical, taken along with that which has just been described on healthy subjects, proves, in my opinion, that there is in us a power of augmenting the intensity of an excitation whenever we attend to it. Attention is comparable to will ; it is, in fact, nothing else than will directed towards the organs of the senses and the processes of ideation. Just as by the will we can stop a movement or augment its energy, so by attention we can weaken or augment the effect of a peripheral excitation. But I reserve the study of attention for another time.

My aim here was simply to show that the rudiment of those states of double consciousness which we have studied first in the hysterical, may with a little attention be found in normal subjects. This result might have been inferred from the numerous observations on automatic writing which have been made on subjects free from hysteria. Automatic writing is the best known of these facts of double consciousness ; but we have seen that it is not isolated. It is only one in a large class of phenomena, others being the repetition of communicated movements, suggestion by contact, insensibility by distraction, &c. All these phenomena, when brought together, throw light on one another and attest the formation of a centre of consciousness functioning independently of the common centre. My experiments appear to me to demonstrate that many normal subjects, if not all, are apt to have their psycho-motor centres thus disaggregated.

Of course my experiments were not complicated enough to prove that the psycho-motor centres of the

hand and arm, which I have caused to act independently, are accompanied by states of consciousness. I have therefore not succeeded in demonstrating double consciousness in healthy as in hysterical subjects. I have only established the existence of the first degree of the phenomenon.

Of the five subjects specially studied, I have only found one—a lady of fifty—who, in spite of repeated experiments, displayed neither automatic writing, nor suggestion of the hand by contact, nor automatic repetition of movements. The only fact observed with this lady is that, when she reads while holding a pen in the position necessary for writing, her right hand insensibly traces with the pen a straight line from left to right. I must add that she declares herself almost incapable of attentively following her reading while experiments are being made on her hand; her attention, in spite of every effort, goes with curiosity to her hand and spies out all that is taking place there.

The four other persons who submitted themselves to my researches displayed the phenomena of double consciousness. In two these phenomena were rudimentary; in the two others they were very developed. According to their own evidence, these four subjects can fix their attention on their reading with sufficient force not to feel anything that is taking place in their hand.

It seemed to me then that attention was an important condition of the success of my researches. Accordingly, I made the following experiment on my two best subjects.

I studied first the repetition of passive movements whilst reading was occupying their attention other-

wise. The repetition was very distinct and developed. It might continue more than a minute without the knowledge of the subject. If, for example, the pencil held in the hand had been made to trace a series of curls, the hand went on of itself to trace as many as a hundred more.

I now requested the subject to leave off her reading, to close her eyes, and to think with all possible attention of what was taking place in her hand. In these new conditions the repetition of passive movements appeared to diminish. When I asked the subject to look attentively at her hand while it was being made to trace curls, the movement stopped before it had well begun. The stoppage was here caused by the attention of the subject, by her will ; in short, by all the elements of her personality.

This is not all. I requested the same subject to resume her reading, and began again to impress movements on her hand. Under the influence of this mental distraction, the repetition of the movement reappeared ; but it was much less distinct than before. The experiments had somehow instructed the subject, and it is probable that, in spite of the attention she gave to her reading, she watched her hand and prevented the movements from taking place.

At this point I thought of an experiment which has thrown light on the very delicate mechanism of these psycho-motor reactions. Instead of occupying the subject with easy reading, I put before her a long addition-sum, and required her to do it without the smallest mistake. What I had foreseen happened ; repetition of the movements communicated to the hand began again, with a distinctness and a persistency which it did not possess during the reading.

This experiment gave me the key to the problem I was trying to solve. I think I may sum up my last result thus: the state of voluntary distraction produced in the subject by the more exacting operation of addition prevents the consciousness, the attention and the will from inhibiting the movements of the hand.

A conclusion like this will perhaps, for a superficial reader, have the appearance of a truism, and I should be very glad if it appeared absolutely commonplace. But, when examined with care, the facts are seen to be very curious and significant. The experiments just described consist essentially in evoking two psycho-physiological processes which have nothing in common, such as reading on one side and repetition of a manual movement on the other. In the persons experimented on, the second of these processes was accomplished better when accompanied by the first. The automatic movements of the hand were only distinct when the subject was at the same time reading or adding up figures.

This is not like our common experience. In most cases the mind cannot do two different pieces of work at once without one of them suffering and sometimes both. I have been able to establish this as it were *de visu* in experiments I have been following out for some time on the conflict of states of consciousness. The procedure I have employed—which I shall describe at greater length elsewhere—consists in making a person squeeze an india-rubber tube rhythmically, while reading, or adding up mentally, or the like. The india-rubber tube is connected with a registering apparatus, and the pressures of the hand translate themselves into a tracing of which the slightest irregularities can be detected. Now this tracing is fre-

quently irregular in the parts that coincide with the reading or addition; and the irregularities are the more marked the more difficult and complicated the mental labor which the subject is asked to perform.

This result, compared with that which I obtained in my experiments on automatic movements, is soon shown to be its inverse, and apparently its contradictory. The more the subject is distracted (by reading, mental calculation, &c.) the more irregular become the *voluntary* movements of the hand transmitted to the india-rubber tube; and, if the distraction is very intense, these movements may cease completely. On the contrary, the more distracted the subject is, the more regular and considerable become the *automatic* movements of the hand. The contrast is quite striking.

I am in no haste to generalize these results. I only state what took place in my subjects.

The explanation of the difference observed between the conditions of voluntary movement and those of automatic movement, however, appears to me a comparatively easy matter. When a person is asked to do two things at a time—to read a book, for example, and to execute some manual task—two motor impulses are evoked which start from the same personality, from the same focus of consciousness. For it is the same person that is charged to do the two things at once,—to divide his attention and will between the two things. This coexistence of the two operations must evidently make each separately less perfect. The more attention each exacts because of its complexity, the more both will have to suffer from being carried on together.

On the contrary, when an automatic action is

evoked in one of the limbs by a stratagem—when the hand is forced, for example, to execute certain movements without consciousness—it is not the conscious personality of the subject that is appealed to. His conscious personality would only interfere in the experiment to inhibit the movement. This inhibition we avoid by turning away his attention; and, if there is no inhibition when the person is distracted, it is due to the same cause that makes him unable to voluntarily squeeze the tube with regularity when he is distracted.

Schematising these complex relations of states of consciousness, I arrive at the following result. In the case where a person performs at once a mental addition and a muscular act, let the first operation be called *a* and the second *b*. Observation shows that each of them is prejudicial to the other, tends to inhibit it. Let the automatic activity of the hand be called *c*. There is in each subject a power to perceive this activity and to suppress it by holding the hand motionless. Let this operation be called *b*. The operation *b* then can inhibit *c*. But occupation of the subject with reading, by provoking the operation *a*, prevents him from inhibiting the movements of his hand; that is to say, *a* is permitted to inhibit *b*, and this prevents *b* from inhibiting *c*. There is here, to use a happy expression of M. Brown-Séguard, *inhibition of a cause of inhibition*.

* * *

I wait for a future opportunity of following up this interesting line of study. If I make known my first results, it is because they bear on almost normal subjects, and because, consequently, every one can, with a little attention and patience, check all that I

advance. Perhaps the results will be different for different persons.

However that may be, the observations I have just related may contribute to show the rather embarrassing complexity of those inhibitory actions which psychologists have only begun to study within the last years.

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